

HP MPX200 Multifunction Router User Guide

Abstract

This document describes the MPX200 Multifunction Router, which supports HP 3PAR StoreServ, P6000 EVA, and P9000/XP families of Fibre Channel storage systems for integrated iSCSI connectivity, FCIP, FCoE, and data migration (see the *Data Migration Services User's Guide*).

This document is intended for system administrators with knowledge of HP 3PAR StoreServ 10400/10800, 7200/7400, F200/F400, T400/T800, P65x0/P63x0, EVA4x00/6x00/8x00, and P9000/XP storage systems, HP Fibre Channel SANs, Ethernet, TCP/IP networking, iSCSI, FCIP, and FCoE.



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1 MPX200 Multifunction Router overview

This user guide provides information to help you do the following:

- Understand the MPX200 options and configurations
- Plan the installation of the MPX200
- Install the MPX200—For high availability, install an additional MPX200 blade option
- Configure the MPX200 – For iSCSI, FCoE, and FCIP
- Manage the MPX200 using HP P6000 Command View or mpx Manager
- Troubleshoot the MPX200
- Use the CLI
- Interpret error messages

MPX200 features

The HP P6000/EVA, HP 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, and XP families of Fibre Channel storage systems are supported for integrated iSCSI connectivity using the MPX200. The MPX200 hardware is integrated with up to four P6000 EVA, HP 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, or XP24000/20000 storage systems for iSCSI connectivity, to deliver multi-protocol capabilities. This provides iSCSI and FC attached servers access to block storage through an FC network and an Ethernet IP network simultaneously.

The MPX200 supports multiple functions including iSCSI, FCoE (10-GbE models), FCIP, and online or offline data migration. FCIP and data migration are license-enabled features. See [Table 2 \(page 13\)](#).

The MPX200 functions are supported separately or simultaneously in the following configurations:

- iSCSI and/or FCoE
- FCIP (license required)
- Data migration (license required)
- iSCSI/FCoE and FCIP (license required)
- iSCSI/FCoE and data migration (license required)

For more information about MPX200 simultaneous operation, see [“Planning the MPX200 installation” \(page 20\)](#). For more information on data migration, see the *Data Migration Services User’s Guide*.

MPX200 storage system support

The MPX200 storage system support may be different based on the protocol. Not all storage system models are supported on all the MPX200 supported protocols. The storage system support for each MPX200 protocol is described in [Table 1 \(page 11\)](#).

Table 1 MPX200 storage system support by protocol

Storage system	MPX200 iSCSI Target support and management software	MPX200 FCoE Target support and management software	MPX200 FCIP SAN extension support and management software (MPX200 CLI)	MPX200 data migration support and management software (mpx Manager)
HP 3PAR StoreServ 7000; HP 3PAR StoreServ 10000, HP 3PAR T-Class, HP 3PAR F-Class	Yes (mpx Manager)	Yes (mpx Manager)	Yes	Yes (destination)
HP P2000 G3 FC				Yes (destination)
HP P4000				Yes (destination)
HP P9500			Yes	Yes (source/destination)
HP P65x0/63x0	Yes (P6000 Command View)	Yes (P6000 Command View)	Yes	Yes (destination)
HP 3PAR S-Class				Yes (source)
XP24000/20000	Yes (mpx Manager)		Yes	Yes (source/destination)
XP12000/10000			Yes	Yes (source/destination)
HP SVSP				Yes (source)
HP EVA4x00/6x00/8x00	Yes (P6000 Command View)	Yes (P6000 Command View)	Yes	Yes (source/destination)
HP EVA3000/5000			Yes	
MSA1500/1000/2012f				
Dell Compellent Series 30, 40				
Dell EqualLogic family (iSCSI)				
EMC CLARiON CX, AX				
EMC Symmetrix DMX				
EMC Symmetrix VMAX SE				
EMC VNX5500				
HDS AMS family				
HDS Lightning 99xx V series				Yes (source)
HDS TagmaStore Network Storage Controller model NSC55				
HDS Thunder 95xx V series				
HDS USP family				
HDS VSP				
HDS WMS family				
IBM DS3000 family				
IBM DS4000 family				
IBM DS5000 family				

Table 1 MPX200 storage system support by protocol (continued)

Storage system	MPX200 iSCSI Target support and management software	MPX200 FCoE Target support and management software	MPX200 FCIP SAN extension support and management software (MPX200 CLI)	MPX200 data migration support and management software (mpx Manager)
IBM DS6000 family				
IBM DS8000 family				
IBM nStorwize V7000 Unified disk system				
IBM XIV Storage System family				
NetApp FAS2000 Series				
NetApp FAS270				
NetApp FAS3100 Series				
NetApp FAS6000 Series				
Xiotech Enterprise 5000 MRC 1, MRC 2				
Xiotech Mag3D 4000				

For the latest information about MPX200 support, see the HP SPOCK website at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

For more information on data migration, see the *Data Migration Services User's Guide*.

The MPX200 is available from HP factory-integrated with a P6000 EVA or XP24000/20000 storage system or as a field upgrade to an existing storage system. iSCSI connectivity to the storage system is provided for servers through a standard 1-GbE or 10-GbE NIC.

Management software

Management software for MPX200 iSCSI, FCoE, and data migration is available for download at the following HP websites:

- For HP P6000 Command View:
 1. Go to <http://www.hp.com/go/hpsc>.
 2. Under **Support Options/DOWNLOAD OPTIONS**, click **Drivers, Software, & Firmware**.
 3. Enter HP P6000 Command View Software in the **Find an HP product by search** box and click **GO**.
 4. Select **HP P6000 Command View Software**.
 5. Select **Cross operating system**.
 6. Under Downloads, click **Download** for the desired software.
- For mpx Manager:
 1. Go to <http://www.hp.com/go/hpsc>.
 2. Under **Support Options/DOWNLOAD OPTIONS**, click **Drivers, Software, & Firmware**.
 3. Enter MPX 10-1GbE Base Multifunction Router in the **Find an HP product by search** box and then click **GO**.
 4. Select **HP MPX 10-1GbE Base Multifunction Router**.
 5. Select the driver language.
 6. Select the operating system.
 7. Under Downloads, click **Download** for the desired software.

NOTE: The HP Storage mpx Manager software is available as a separate download or as part of the HP Storage Data Migration Utilities kit which includes additional data migration tools.

The MPX200 chassis contains one or two router blades, two PCMs, and a mid-plane. There are two types of router blades: a 4-port 1-GbE blade and a 2-port 10-GbE/2-port 1-GbE blade. Both blade options include two 8-Gb/s FC ports. MPX200 dual-blade configurations provide for high availability with failover between blades.

NOTE: Each PCM has three variable-speed fans that provide power and cooling. You can remove and replace a PCM at any time. To ensure that the MPX200 chassis remains operational, there must be at least one functioning PCM. Each PCM is capable of powering two blades. The PCM cools the corresponding blade; therefore, when you remove a PCM, you must replace it within 7 minutes or the blade will shut down due to an over-temperature condition.

Table 2 (page 13) lists the MPX200 options.

Table 2 MPX200 options

Option	Option includes	Order with
HP MPX200 1GbE Base Chassis	<ul style="list-style-type: none">One chassisOne 1-GbE blade with four 1-GbE iSCSI ports and two 8-Gb/s FC portsRail kitAccessory kitDocumentationRedundant power supplies	Up to four P6000 EVA, 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, or XP24000/20000 storage systems, or order separately to upgrade existing storage systems
HP MPX200 1 GbE Upgrade Blade	<ul style="list-style-type: none">One 1-GbE blade with four 1-GbE iSCSI ports and two 8-Gb/s FC portsAccessory kitDocumentation	An MPX200 base chassis and up to four P6000 EVA, 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, or XP24000/20000 storage systems, or to upgrade existing storage systems to provide high-availability multipath connectivity
HP MPX200 10-1GbE Base Chassis	<ul style="list-style-type: none">One chassisOne 10-GbE/1-GbE blade with two 10-GbE and two 1-GbE iSCSI ports, and two 8-Gb/s FC portsRail kitAccessory kitDocumentationRedundant power supplies	Up to four P6000 EVA, 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, or XP24000/20000 storage systems, or order separately to upgrade existing storage systems
HP MPX200 10-1GbE Upgrade Blade	<ul style="list-style-type: none">One 10-GbE/1-GbE blade with two 10-GbE and two 1-GbE iSCSI ports, and two 8-Gb/s FC ports.Accessory kitDocumentation	An MPX200 base chassis and P6000 EVA, 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, or XP24000/20000 storage systems, or to upgrade up to four existing storage systems to provide high-availability multipath connectivity
HP MPX200 Half Chassis FCIP License	Includes the license to enable FCIP functionality in one out of two bays (slots) in an MPX200 chassis.	

Table 2 MPX200 options (continued)

HP MPX200 Full Chassis FCIP License	Includes the license to enable FCIP functionality for both bays (slots) in an MPX200 Chassis. For multipath (redundant blade for high availability), order the full chassis license TA767A.	
HP MPX200 1TB Full Chassis Data Migration License	Includes the license to migrate 1 TB of data using an MPX200 Chassis.	
HP MPX200 5TB Full Chassis Data Migration License	Includes the license to migrate 5 TB of data using a MPX200 Chassis.	
HP MPX200 Full Chassis 1 Array Data Migration License	Includes the license to migrate data from or to a single array using a MPX200 Chassis.	

NOTE: When configured for iSCSI bridging, HP recommends use of the same blade option type (1 GbE or 10GbE-1GbE) in a common chassis to ensure balanced performance in a redundant configuration.

The following additional equipment is required to configure the MPX200:

- B-series, C-series, or H-series FC switch (iSCSI fabric-attached, data migration, or FCIP)
- Optical SFP transceivers
 - FC ports, 8 Gb/s short-range SFP (AJ718A)
 - FC ports, 4 Gb/s short-range SFP (A744B)
 - 10-GbE ports, short-range SFP+ (455883-B21)
- Optical FC cables, copper FC cables (direct-connect only)
- Cat5e or Cat6 GbE network cables
- Supported Direct Attach Copper 10GbE SFP+ Ethernet cables:
 - HP ProCurve 10-GbE SFP+ 1m Direct Attach Cable (J9281B)
 - HP ProCurve 10-GbE SFP+ 3m Direct Attach Cable (J9283B)
 - HP ProCurve 10-GbE SFP+ 7m Direct Attach Cable (J9285B)
 - HP ISS 10-GbE SFP+ 0.5m Direct Attach Cable (487649-B21)
 - HP ISS 10-GbE SFP+ 1m Direct Attach Cable (487652-B21)
 - HP ISS 10-GbE SFP+ 3m Direct Attach Cable (487655-B21)
 - HP ISS 10-GbE SFP+ 7m Direct Attach Cable (487658-B21)
 - Cisco 10-GbE SFP+ 3m Direct Attach Cable SFP-H10GB-CU3M (AP784A)
 - Cisco 10-GbE SFP+ 5m Direct Attach Cable SFP-H10GB-CU5M (AP785A)
 - Brocade 10-GbE SFP+ 1m Direct Attach Cable XBR-TWX-0101 (AP818A)
 - Brocade 10-GbE SFP+ 3m Direct Attach Cable XBR-TWX-0301 (AP819A)
 - Brocade 10-GbE SFP+ 5m Direct Attach Cable XBR-TWX-0501 (AP820A)

For FC switch model support, see “MPX200 iSCSI configuration rules and guidelines” (page 52) and the SPOCK website at <http://www.hp.com/storage/spock>.

MPX200 configuration options for P6000 EVA

You can configure a P6000 EVA storage system for simultaneous connectivity to iSCSI/FCoE and FC attached hosts. Support for iSCSI/FCoE to a P6000 EVA is provided through the MPX200 and an FC switch fabric port (fabric attach) or the MPX200 directly connected to the P6000 EVA.

NOTE: Directly connecting an MPX200 FC port and a P6000 EVA requires the P6000 EVA controller port to be set to Direct.

Figure 1 (page 15) illustrates an MPX200 single-blade fabric-attached configuration. This is the lowest-cost configuration and is used when high availability for iSCSI hosts is not required.

Figure 1 MPX200 single-blade fabric-attached configuration

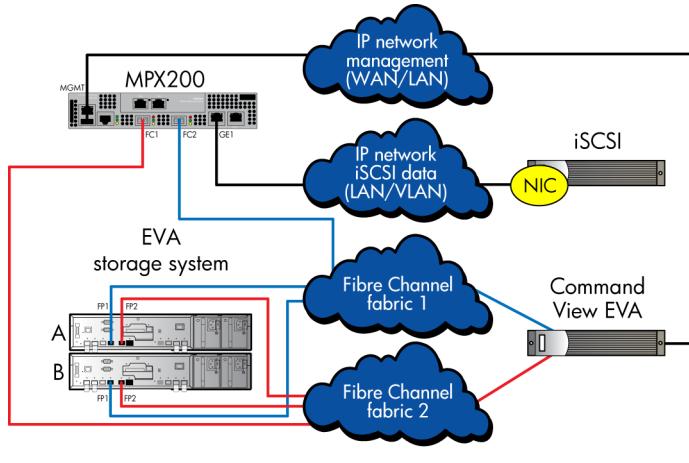


Figure 2 (page 15) illustrates an MPX200 dual-blade fabric-attached configuration. This configuration provides high availability with failover between blades.

NOTE: A dual-blade configuration may require reconfiguration of device mappings.

Figure 2 MPX200 dual-blade fabric-attached configuration

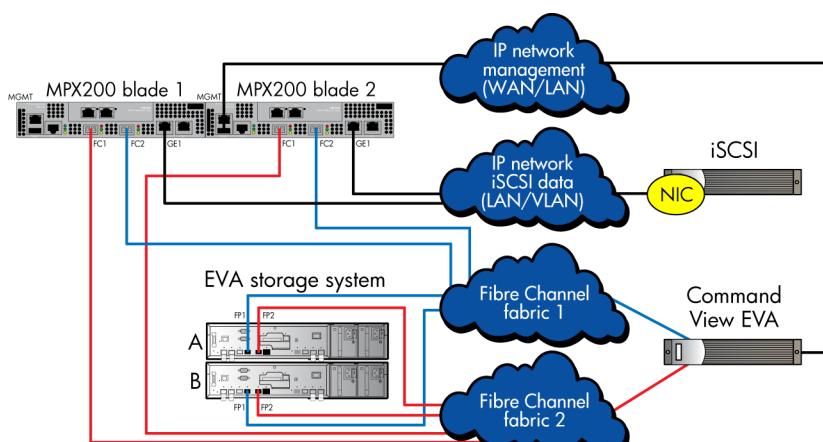


Figure 3 (page 16) illustrates a multi-P6000 EVA configuration with connectivity for up to four P6000 EVA storage systems from a single MPX200 blade.

Figure 3 MPX200 single-blade multi-P6000 EVA configuration

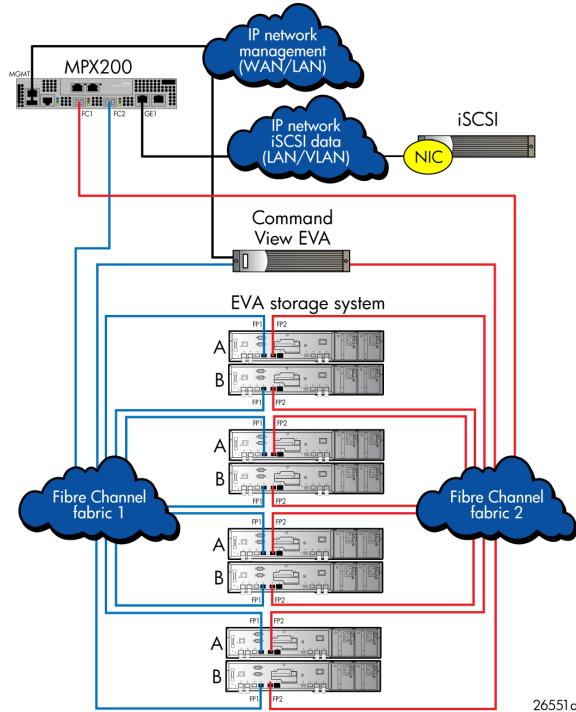


Figure 4 (page 16) illustrates a multi-P6000 EVA configuration with connectivity for up to four P6000 EVA storage systems from dual MPX200 blades. This configuration provides high availability with failover between blades.

Figure 4 MPX200 dual-blade multi-P6000 EVA configuration

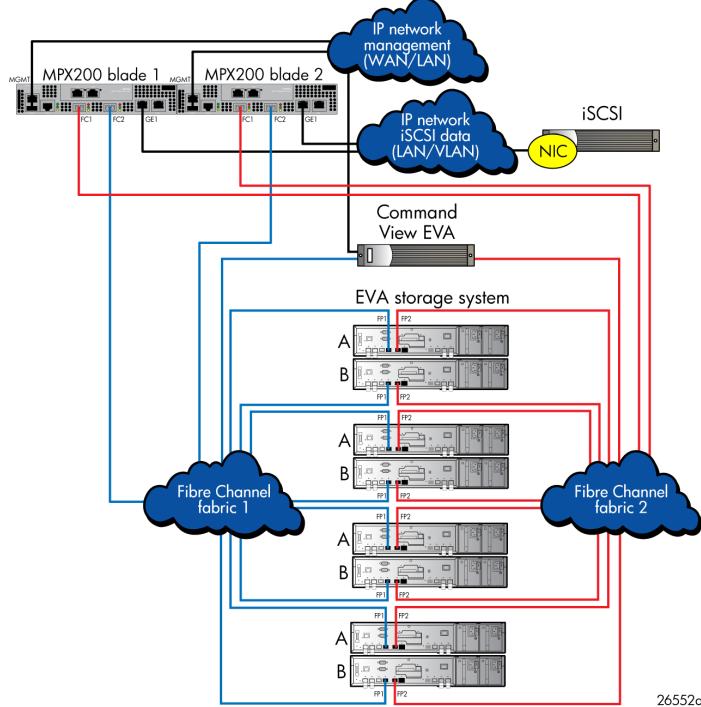
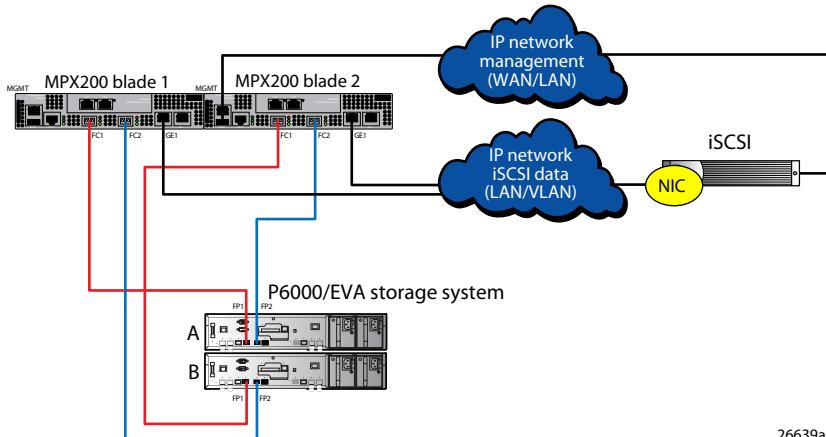


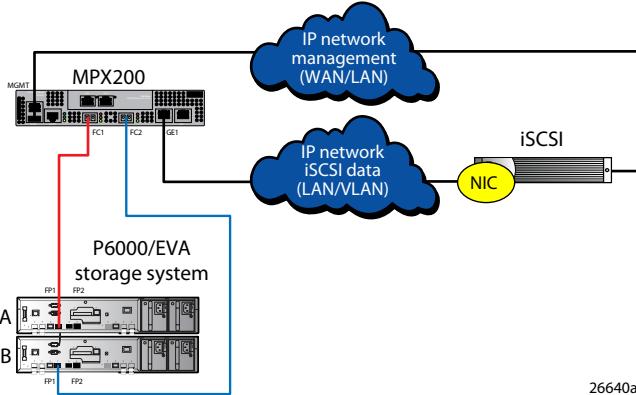
Figure 5 (page 17), Figure 6 (page 17), and Figure 7 (page 17) illustrate P6000 EVA direct connect configurations.

Figure 5 MPX200 dual-blade direct connect to one P6000 EVA configuration



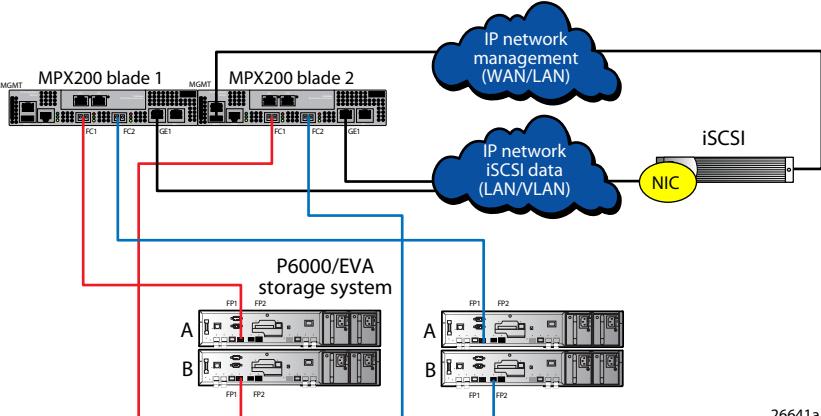
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Figure 6 MPX200 single-blade direct connect to one P6000 EVA configuration



26640a

Figure 7 MPX200 dual-blade direct connect to two P6000 EVAs configuration



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MPX200 configurations for XP24000/20000

An XP storage system can be configured for simultaneous connectivity to iSCSI and FC attached hosts. Support for iSCSI to an XP storage system is provided through the MPX200 and an existing FC switch fabric port (fabric-attached).

Figure 8 (page 18) shows an MPX200-XP single-blade fabric-attached configuration. This is the lowest-cost configuration and is used when high availability for iSCSI hosts is not required.

Figure 8 MPX200-XP single-blade fabric-attached configuration

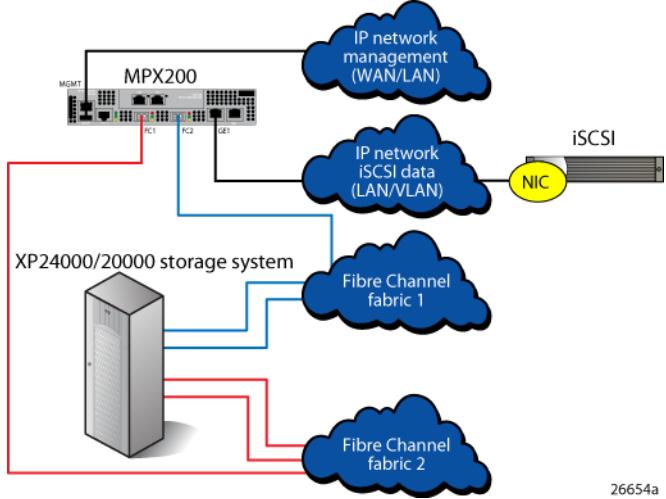


Figure 9 (page 18) shows an MPX200-XP dual-blade fabric-attached configuration. This configuration provides high availability with failover between blades.

Figure 9 MPX200-XP dual-blade fabric-attached configuration

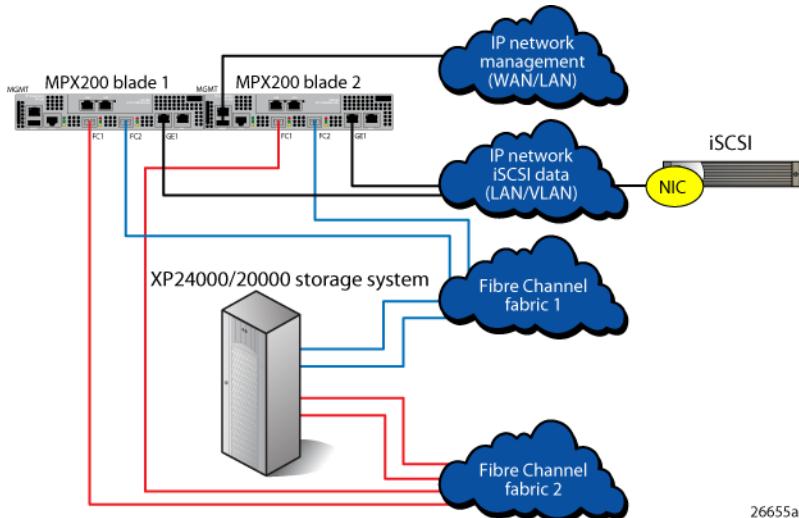
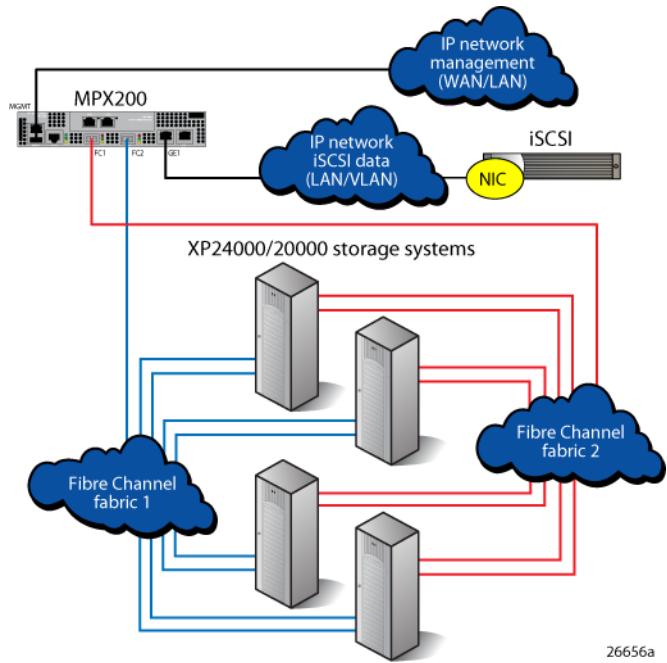


Figure 10 (page 19) shows a multi-XP configuration with connectivity for up to four XP storage systems from a single MPX200 blade.

Figure 10 MPX200-XP multi-XP fabric-attached configuration



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2 Planning the MPX200 installation

Prior to installation, it is important to define the requirements for server connectivity and MPX200 multifunction usage. You should consider present and future needs as they relate to MPX200 configuration attributes and installation recommendations.

Installation recommendations

Before installing the HP MPX200 Multifunction Router, HP recommends that you:

- Develop an installation and configuration plan for your FC-SAN and Ethernet IP-SAN environments.
- Review all documentation.
- Determine if the IP-SAN is *lossy* or *lossless* (Enhanced Ethernet) and if iSCSI or FCoE is deployed.

The MPX200 supports the following functions: iSCSI-FCoE, FCIP, Data Migration. For simultaneous operation, you can configure the MPX200 chassis with a single blade or dual blades to run up to two functions per blade in the combinations shown in [Table 3 \(page 20\)](#).

Table 3 MPX200 blade configurations

Single blade chassis (blade1/empty)	Dual-blade chassis (blade1/blade2)
iSCSI-FCoE/empty	iSCSI-FCoE/iSCSI-FCoE
iSCSI-FCoE-FCIP/empty	iSCSI-FCoE-FCIP/iSCSI-FCoE-FCIP
iSCSI-FCoE-DMS/empty	iSCSI-FCoE-DMS/iSCSI-FCoE-DMS
FCIP/empty	FCIP/FCIP
DMS/empty	DMS/DMS
	iSCSI-FCoE-DMS/iSCSI-FCoE-FCIP
	iSCSI-FCoE-FCIP/iSCSI-FCoE-DMS

- Simultaneous iSCSI and FCoE are considered one function. FCoE is only supported with 10-GbE models.
- When configuring for blade redundancy, you must configure both blades. To add a redundant blade, you must un-present/re-present existing LUN presentations to gain access through the second blade.

NOTE: When configured for iSCSI bridging, HP recommends use of the same blade option type (1 GbE or 10GbE-1GbE) in a common chassis to ensure balanced performance in a redundant configuration.

- Dual-blade iSCSI-FCoE configurations are always configured for high availability.
- Dual-blade FCIP configurations can be configured for separate operation or high availability.
- A license is required for FCIP, half-chassis or full chassis.
- A license is required for data migration, 1TB, 5TB, or 1 Array. FCIP is not required for remote data migration.

NOTE: For more information on data migration, see the *Data Migration Services User's Guide*.

[Table 4 \(page 21\)](#) describes the MPX200 supported configuration maximums for ports, blades, and chassis.

Table 4 MPX200 supported configuration maximums

Configuration parameter	Per port	Per blade	Per chassis (2 blades ¹)
iSCSI connections, 1-GbE model	256	1,024	2,048
iSCSI-FCoE connections, 10-GbE model	2,048 ²	2,048	4,096
Initiators, 1-GbE model	N/A	300	300
FCoE Initiators, 10-GbE model	N/A	600	600
LUNs, 1-GbE model	N/A	4,096	4,096
FCoE LUNs, 10-GbE model	N/A	4,096	4,096
Targets	N/A	Up to four 3PAR, EVA, or XP storage systems ³	Up to four 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, P6000 EVA, or XP storage systems ³

¹ For mixed-blade chassis configurations that include one 1-GbE blade and one 10-GbE blade, the supported maximums are the 1-GbE values.

² 10-GbE ports only.

³ For iSCSI connectivity, a total of 4 storage systems supported (any mix of 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, P6000 EVA, or XP24000/20000 arrays).

iSCSI/FCoE operation

You can configure the MPX200 with a single blade or with two (redundant) blades.

Total number of initiators

With two blades, the initiator is registered in both blades for consistency, whether or not you intend to access both blades.

Number of paths required per initiator

After establishing the number of initiators, determine how many paths are required by each. The number of connections per blade is finite, and every initiator login constitutes a connection to the MPX200. In a multipath environment, HP recommends a minimum of one connection per blade; high-performance applications may require up to four connections per blade (a total of eight).

Use of iSNS

The MPX200 presents one iSCSI target for each VPG (a total of four). Each initiator, therefore, discovers four times the number of FC targets. HP recommends that you use iSNS to present to the initiator only the required iSCSI targets.

Use of iSCSI ports

When configuring the MPX200 for iSCSI, there are four available iSCSI ports per blade. For high performance and maximum initiator connectivity, HP recommends that you use all available ports.

Balancing the load

HP recommends that you use all iSCSI ports for both 1-GbE and 10-GbE blades. If multiple 1-GbE initiators are required, ensure that logins are spread across all 1-GbE ports. For 10-GbE blades, you can place a higher number of initiators on the 10-GbE ports than on the 1-GbE ports.

Because iSCSI and data migration traffic can share the same FC ports, it is prudent to understand how each function effects the other during I/O operation. The use of bandwidth throttling for data migration or MPIO for iSCSI provides a mechanism to allocate FC bandwidth to each function.

10-GbE initiators

HP recommends that you map servers with 10-GbE NICs for login to the 10-GbE ports on the MPX200.

MPX200 storage and IP network best practices

The following sections list requirements and recommendations for optimal results.

Prerequisites

Prerequisites for using this product include:

- A Fibre Channel switch installed in your environment for MPX200 fabric-attached configurations
- Equipment cabinet suitable for 2U-sized enclosures
- A 1 GbE or 10-GbE switch to connect to the MPX200 1GbE iSCSI ports or to the MPX200 10GbE iSCSI/FCoE ports as iSCSI targets
- Converged network switch, if planning to configure the MPX200 as an iSCSI/FCoE target, and separately configured iSCSI and FCoE VLANs
- Cat5e or Cat6 cabling to the MPX200 1 GbE iSCSI data ports
- HP-recommended 10-GbE SFP+ optical transceivers or 10-GbE SFP+ copper cabling to the 10-GbE iSCSI/FCoE data ports (see the MPX200 QuickSpec for part numbers)
- For 10-GbE connectivity, HP recommends OM3 or HP PremierFlex LC-LC (OM3+, OM4) type cabling

Planning your storage configuration

Proper planning of the storage subsystem and its subsequent performance is critical to a successful deployment of the MPX200 and connected storage systems. Improper planning or implementation can result in wasted storage space, degraded performance, or inability to expand the system to meet growing storage needs. Planning considerations include:

- System and performance expectations
- Striping methods
- RAID levels
- Hard drive sizes and types
- Spare drives
- Number of storage systems (up to 4) and sizing (capacity)
- Number of Fibre Channel presented virtual LUNs
- Number of iSCSI and FCoE initiators
 - 1 GbE iSCSI per chassis (1 or 2 blades): 300 initiators or logins maximum
 - 10 GbE iSCSI/FCoE per chassis (1 or 2 blades): 600 initiators or logins maximum
- Number of virtual LUNs to be presented to the iSCSI and FCoE initiators
 - 1 GbE iSCSI per chassis (1 or 2 blades): 4096 LUNs maximum
 - 10 GbE iSCSI/FCoE per chassis (1 or 2 blades): 4096 combined iSCSI and FCoE LUNs maximum
- FCoE requires a converged network switch that implements DCB standards for lossless Ethernet.

You can build a high-performance, highly available IP-SAN in a variety of ways. Consider an enterprise-class switch infrastructure as detailed in [Table 1 \(page 11\)](#) to minimize packet discard, packet loss, and unpredictable performance. Consider implementing the 10-GbE IP-SAN on a

lossless Ethernet network, utilizing DCB switches. Within a 10-GbE based data center, consider implementing the FCoE protocol.

General IP-SAN

For best results, follow these IP-SAN recommendations:

- For Microsoft Windows Server environments, implement MPIO along with the HP DSM for NIC fault tolerance and superior performance.
- For other operating systems, where supported, implement NIC bonding in the host software for NIC fault tolerance and performance.
- Implement a separate subnet or VLAN for the IP storage network for dedicated bandwidth.
- Implement separate FCoE and iSCSI VLANs.
- Implement a fault-tolerant switch environment as a separate VLAN through a core switch infrastructure or multiple redundant switches.
- Set the individual 1- and 10-Gb ports connected to the storage nodes and servers at auto negotiate full duplex at both the switch and host/node port level.
- Implement switches with full-duplex non-blocking mesh backplanes with sufficient port buffer cache (at least 512 KB per port).
- Implement Flow Control on the storage network switch infrastructure. Flow control can have a dramatic impact on performance in a 10 GbE environment, especially in a mixed 1 GbE and 10 GbE environment. When a network port becomes saturated, excess frames can be dropped because the port cannot physically handle the amount of traffic it is receiving. Packets are then resent, resulting in a performance decrease. An example of this is a 10 GbE link sending data at 10 Gb/s to a single 1 GbE link. Flow control eliminates the problem by controlling the speed at which data is sent to the port. For this reason, best practices dictate that you always enable flow control. You must enable flow control on both the switches and NICs/iSCSI initiators for it to function properly. If flow control is not enabled globally, the network defaults to the lowest common denominator, which would be to have flow control disabled.
- (Optional) Implement Jumbo Frames support on the switch, 1 GbE iSCSI blade, and 10-GbE iSCSI/FCoE blade when iSCSI is configured, and all servers are connected to the IP-SAN. Consider using 4-K Jumbo Frames instead of 9-K Jumbo Frames for better streaming performance.

NOTE: FCoE requires Jumbo Frames and is the default configuration of a CNA, converged network switch, and the 10-GbE iSCSI/FCoE blade when FCoE is configured.

Recommended switch infrastructure for an IP-SAN

HP recommends using HPN ProCurve Ethernet switches, which typically include minimum capabilities for building a high performance fault-tolerant storage network in a relatively easy and cost effective way. Any Enterprise-class managed switch typically has the necessary capabilities that most IP-SAN customers require. [Table 5 \(page 24\)](#) describes minimum recommended Ethernet switch capabilities for an MPX200 based IP-SAN.

For more information about FCoE, see the converged network switches and the *HP SAN Design Reference Guide* at <http://h18006.www1.hp.com/storage/networking/index.html>.

Table 5 MPX200 switch capability

Switch capability	Description
1 and 10 Gigabit Ethernet support	The 1 GbE iSCSI blade of the MPX200 comes with four copper GbE ports (802.3ab). To take advantage of full duplex gigabit capabilities, you need infrastructure of Cat5e or Cat6 cabling. The 10-GbE iSCSI/FCoE blade of the MPX200 comes with two SFP+ 10 Gb ports. You can configure either SFP+ optical or SFP+ copper connectivity. Server connections and switch interconnects can be done via SFP+ fiber cabling, in addition to Cat5e or Cat6 cabling, depending on IP switch capabilities.
Fully subscribed non-blocking backplanes or Adequate per-port buffer cache	For optimal switch performance, HP recommends that the switch have at least 512 KB of buffer cache per port. Consult your switch manufacturer specifications for the total buffer cache. For example, if the switch has 48 Gb ports. You should have at least 24 MB of buffer cache dedicated to those ports. If the switch aggregates cache among a group of ports (that is, 1MB of cache per 8 ports) space your utilized ports appropriately to avoid cache oversubscription.
Flow Control support	IP storage networks are unique in the amount of sustained bandwidth that is required to maintain adequate performance levels under heavy workloads. You should enable Gigabit Ethernet Flow Control (802.3x) technology on the switch to eliminate receive and/or transmit buffer cache pressure. Note: Some switch manufacturers do not recommend configuring Flow Control when using Jumbo Frames, or vice versa. Consult the switch manufacturer documentation. HP recommends implementing Flow Control over Jumbo Frames for optimal performance. Flow control is required when using the HP DSM and MPIO.
Individual port speed and duplex setting	All ports on the switch, servers, and storage nodes should be configured to auto-negotiate duplex and speed settings. Although most switches and NICs will auto negotiate the optimal performance setting, if a single port on the IP storage network negotiates a suboptimal (100 megabit or less and/or half-duplex) setting, the entire SAN performance can be impacted negatively. Check each switch and NIC port to make sure that the auto-negotiation is resolved to be 1000Mb/s or 10Gb/s with full-duplex.
Link Aggregation/Trunking support	It is important to enable Link Aggregation and/or Trunking support when building a high performance fault-tolerant IP storage network. HP recommends implementing Link Aggregation and/or Trunking technology when doing Switch to Switch Trunking, Server NIC Load Balancing and Server NIC Link Aggregation (802.3ad).
VLAN support	Implementing a separate subnet or VLAN for the IP storage network is a best IP-SAN practice. If implementing VLAN technology within the switch infrastructure, typically you need to enable VLAN Tagging (802.1q) and/or VLAN Trunking (802.1q or InterSwitch Link [ISL] from Cisco). Consult your switch manufacturer configuration guidelines when enabling VLAN support.
Spanning Tree/Rapid Spanning Tree	In order to build a fault-tolerant IP storage network, you need to connect multiple switches into a single Layer 2 (OSI Model) broadcast domain using multiple interconnects. In order to avoid Layer 2 loops, you must implement the Spanning Tree protocol (802.1D) or Rapid Spanning Tree protocol (802.1w) in the switch infrastructure. Failing to do so can cause numerous issues on the IP storage networks including performance degradation or even traffic storms. HP recommends implementing Rapid Spanning Tree if the switch infrastructure supports it for faster Spanning Tree convergence. If the switch is capable, consider disabling spanning tree on the server switch ports so that they do not participate in the spanning tree convergence protocol timings. Note: You should configure FCoE with spanning-tree disabled at the first level server edge switch.
Jumbo Frames support	Sequential read and write, or streaming workloads can benefit from a maximum frame size larger than 1514 bytes. The 1 GbE iSCSI and 10 GbE iSCSI/FCoE ports are capable of frame sizes up to 9K bytes. Better performance is realized when the NICs and iSCSI initiators are configured for 4K byte (maximum frame size of 4088 bytes) jumbo frames. You must enable Jumbo frames on the switch, the 1 GbE iSCSI and 10 GbE iSCSI/FCoE modules, and all servers connected to the IP-SAN. Typically, you enable Jumbo Frames globally on the switch or per VLAN and on a per port basis on the server. Note: Some switch manufacturers do not recommend configuring Jumbo Frames when using Flow Control, or vice versa. Consult the switch manufacturer documentation. HP recommends implementing Flow Control over Jumbo Frames for optimal performance.

For optimal availability and performance, consider the following:

- Switch Infrastructure: Dual Redundant 1 or 10 Gigabit switches trunked together for bandwidth and fault-tolerance.
- 1 GbE iSCSI blade and 10 GbE iSCSI blade connectivity: at least one port from each blade connected to each switch.
- 1 GbE iSCSI blade connectivity: When using 2 GE ports, utilize GE port 1 and GE port 3 or GE port 2 and GE port 4 for improved performance balancing.
- Host Server connectivity: Dual NICs connected to the IP storage network with a single port connected to each switch. For Windows 2003/2008, use the HP DSM for MPIO for multiple NIC support.

Network latency

High network latency can be the primary cause of slow I/O performance, or worse, iSCSI drive disconnects. It is important to keep network latency (for example, ping response time measurement) on your IP-SAN subnet below 2 milliseconds. Many factors can contribute to increasing network latency, such as congestion, distance, and router hops. Configuring the IP-SAN on a single IP subnet with layer-2 switching helps to lower the network latency.

Network bandwidth

Network bandwidth required for an IP-SAN depends on the server applications, maintenance utilities, and backup/recovery processes. Most I/O intensive applications, like Microsoft Exchange and SQL Server, do not consume much network bandwidth and are more sensitive to network latency issues. Bandwidth becomes much more important when you are performing maintenance operations, like backup/recovery. Any sequential read/write stream could consume significant bandwidth.

NOTE: Storage data transfer rates are typically measured in bytes while network data transfer rates are measured in bits. A 1 Gb/sec network connection can transfer a maximum of 120–130 MB/sec. Microsoft Windows provides performance monitor counters that can help to determine the data-path bandwidth requirements. Disk Bytes/sec is the rate bytes are transferred to or from the disk during write or read operations.

3 Installing the MPX200

This chapter describes how to rack mount the MPX200.



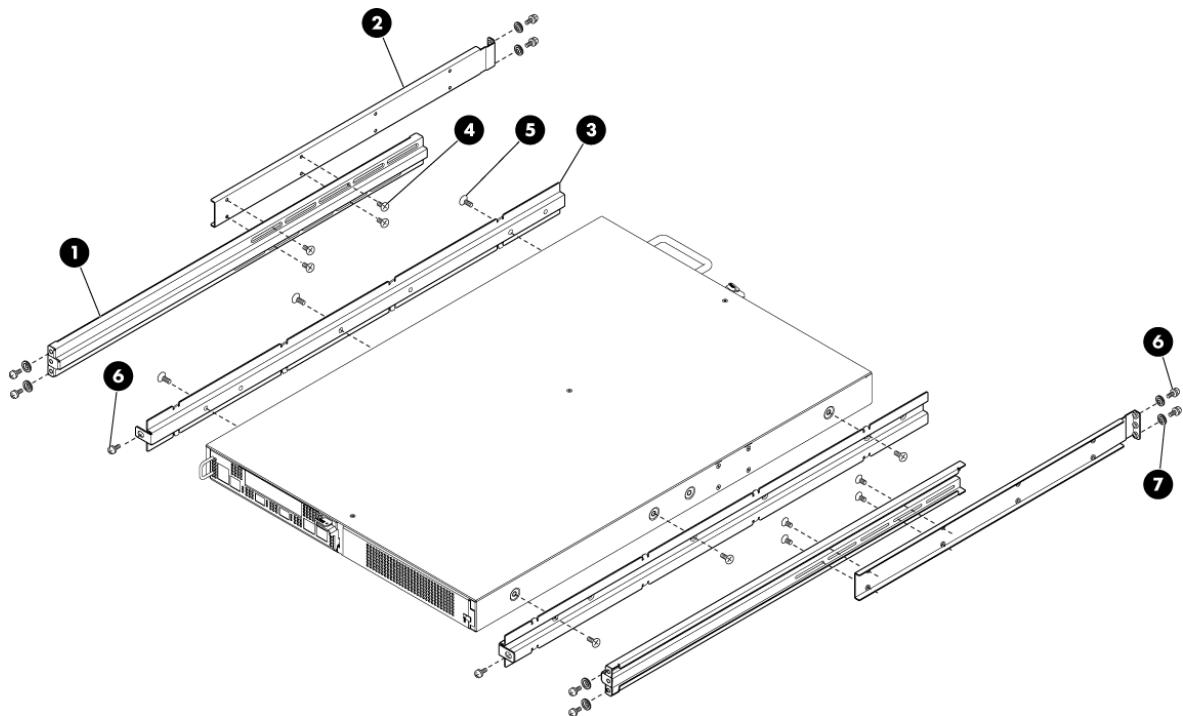
WARNING!

- Mount the MPX200 in the rack so that the weight is evenly distributed. An unevenly loaded rack can become unstable, possibly resulting in equipment damage or personal injury.
- This product is supplied with a 3 wire cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded outlet to avoid electrical shock. An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the switch chassis. It is the responsibility of the customer to ensure the outlet is correctly wired and grounded to prevent electrical shock.
- If the chassis is installed in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the chassis in an environment that is compatible with the maximum ambient rated temperature.

MPX200 components

Figure 11 (page 26) shows the MPX200 components.

Figure 11 MPX200 components



1. Rack rail, inner (2)	2. Rack rail, outer (2)
3. Chassis rail (2)	4. Screw, flathead, 6-32 x 1/4 in. (8)
5. Screw, flathead, 10-32 x 1/4 in. (6)	6. Screw, panhead, 10-32 x 3/8 in. (10)
7. Washer, centering (10); for use on racks with square holes only	

Rack mounting the MPX200

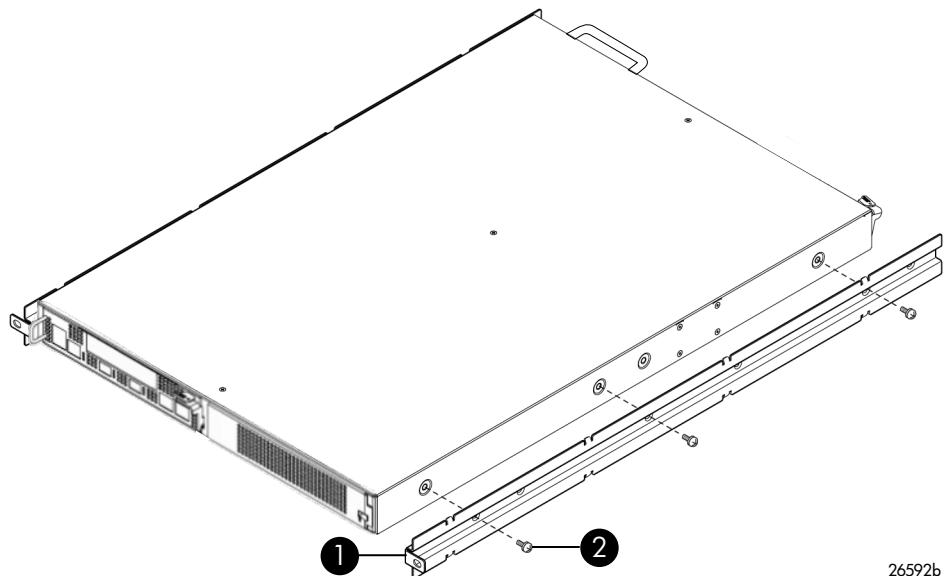
NOTE: Use a crosshead screwdriver to perform the rack mount procedure.

To rack mount the MPX200:

1. Attach the two chassis rails to the MPX200 chassis using three 10-32 x 1/4 in. screws for each rail. Make sure that the end with the flange is facing the rear of the chassis (Figure 12 (page 27)).

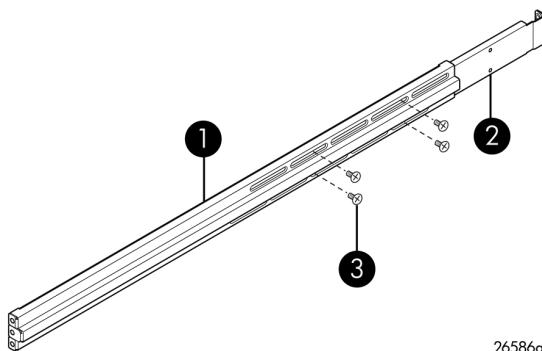
The MPX200 has multiple mounting holes to allow for adjustable setback. Secure the chassis rails in the desired position if additional room is needed.

Figure 12 Chassis rails



1. Chassis rail
2. Screws, flathead, 10-32 x 1/4 in.
2. Assemble the front and rear rack rails; secure them loosely using four 6-32 x 1/4 in. screws (Figure 13 (page 27)).

Figure 13 Rack rails



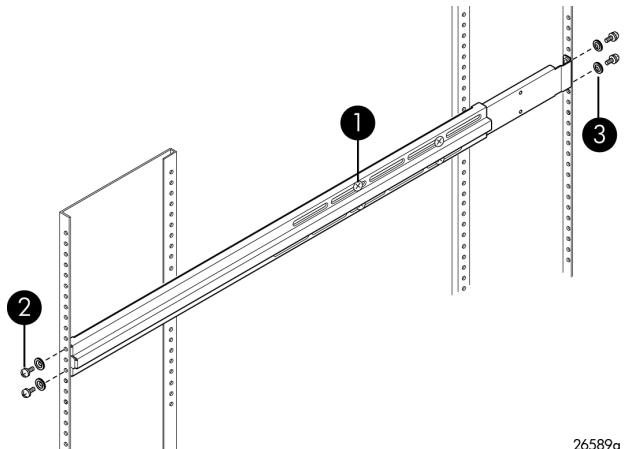
1. Rear rack rail
2. Front rack rail
3. Screw, flathead, 6-32 x 1/4 in.

3. Install the rails in the rack.

There are two inner rails and two outer rails. Slide each inner rail into the corresponding outer rail to create a complete rack rail.

- a. Extend the rack rails to fit the inner dimensions of the rack. The rail flanges on both ends fit inside the rack.
- b. Make sure the inner rail is toward the front of the rack.
- c. Fasten the rail flanges to the rack on both ends using two 10-32 x 3/8 in. screws in the upper and lower holes ([Figure 14 \(page 28\)](#)).

Figure 14 Inner rack view



1. Screw, flathead, 6-32 x 1/4 in.

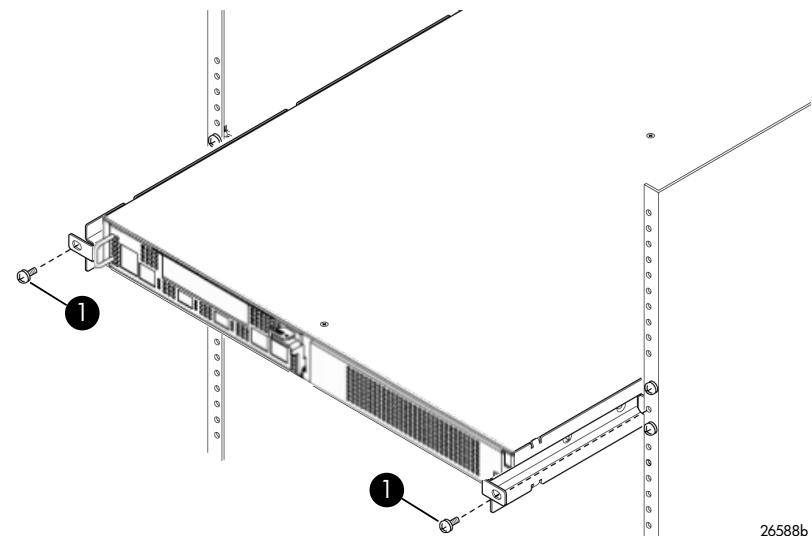
2. Screw, panhead, 10-32 x 3/8 in.

3. Washer

4. Install the chassis in the rack:

- a. Starting from the back of the rack, slide the MPX200 chassis and rail assembly into the rack rails.
- b. Fasten the chassis to the rack using two 10-32 x 3/8 in. screws in the middle hole on each rail flange ([Figure 15 \(page 28\)](#)).

Figure 15 Rear view



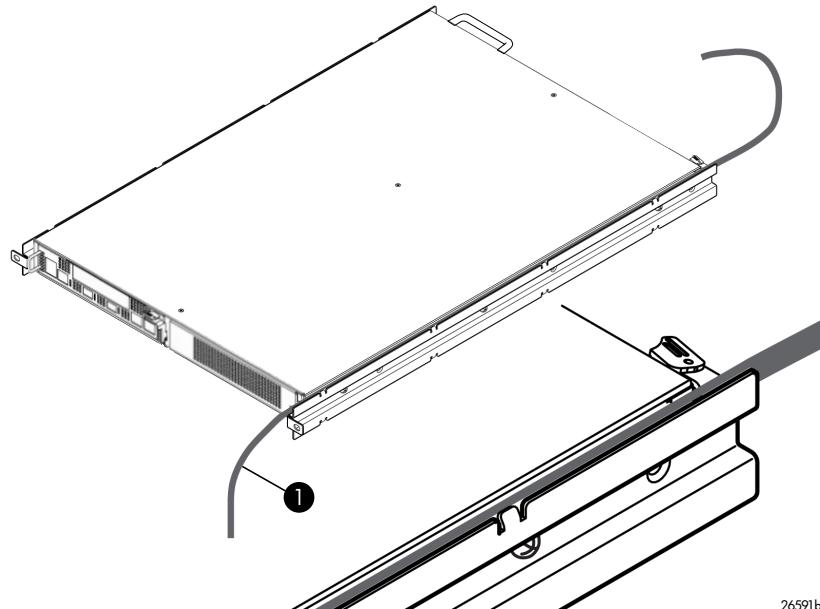
1. Screws, panhead, 10-32 x 3/8 in.

5. Route the power cord:

- a. Starting from the front of the rack, connect the power cord to the MPX200.
- b. For the left blade, route the cord by following the gap between the chassis and the chassis rail (see [Figure 16 \(page 29\)](#)).
- c. Repeat for the right blade.

NOTE: The right blade requires the power cord to extend approximately 30 cm (12 inches) beyond the front edge, due to the positioning of the socket on the PCM.

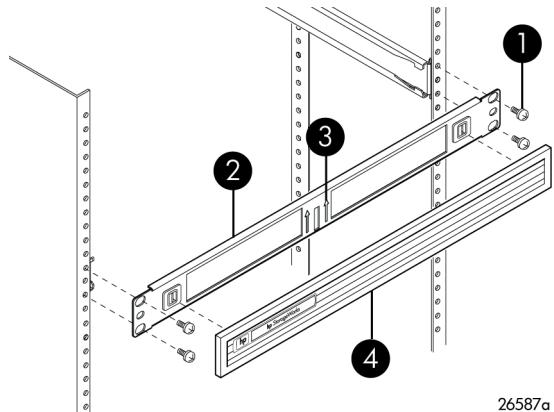
Figure 16 Power cord



1. Power cord

6. Install the HP MPX200 bezel:
 - a. Remove the four 10-32 x 3/8 in. screws that secure the rack rails to the front of the rack.
 - b. Position the bezel support plate in front of the MPX200 chassis, with the arrows pointing up.
 - c. Replace the four 10-32 x 3/8 in. screws, two on each side of the bezel support plate.
 - d. Install the bezel by pushing it through the white pop-in tabs on the bezel support plate (Figure 17 (page 30)).

Figure 17 Bezel view



1. Screw, panhead, 10-32 x 3/8 in.	2. Bezel mount bracket
3. Bracket arrows	4. Bezel

4 Managing MPX200 iSCSI using HP P6000 Command View

This chapter provides instructions for setting up the MPX200 management port, Fibre Channel zoning, HP P6000 Command View discovery, setting up the iSCSI IP ports, and setting the date and time.

NOTE: FCIP functionality is not configured using HP P6000 Command View. For configuration requirements, see “[MPX200 FCIP](#)” (page 108).

Setting up the MPX200 management port

Most management functions have been built into HP P6000 Command View. In some cases, access to the MPX200 CLI is required.

You connect to the CLI through one of the following:

- RS-232 serial port (115200/8/n/1)
- Telnet
- SSH

By default, the management port obtains a DHCP address. If the management port cannot obtain a DHCP address, you must set a static IP address.

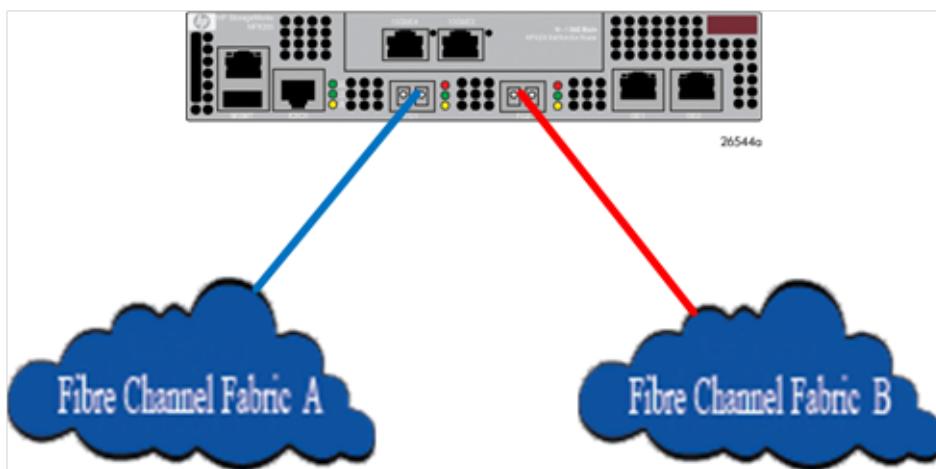
Fibre Channel zoning

Because the MPX200 can be a fabric-connected device, it is important to understand the zoning requirements.

Open zoning

When using an open zone configuration, each FC port on each MPX200 must be connected to a separate fabric (see “[Open zone configuration](#)” (page 31)).

Figure 18 Open zone configuration



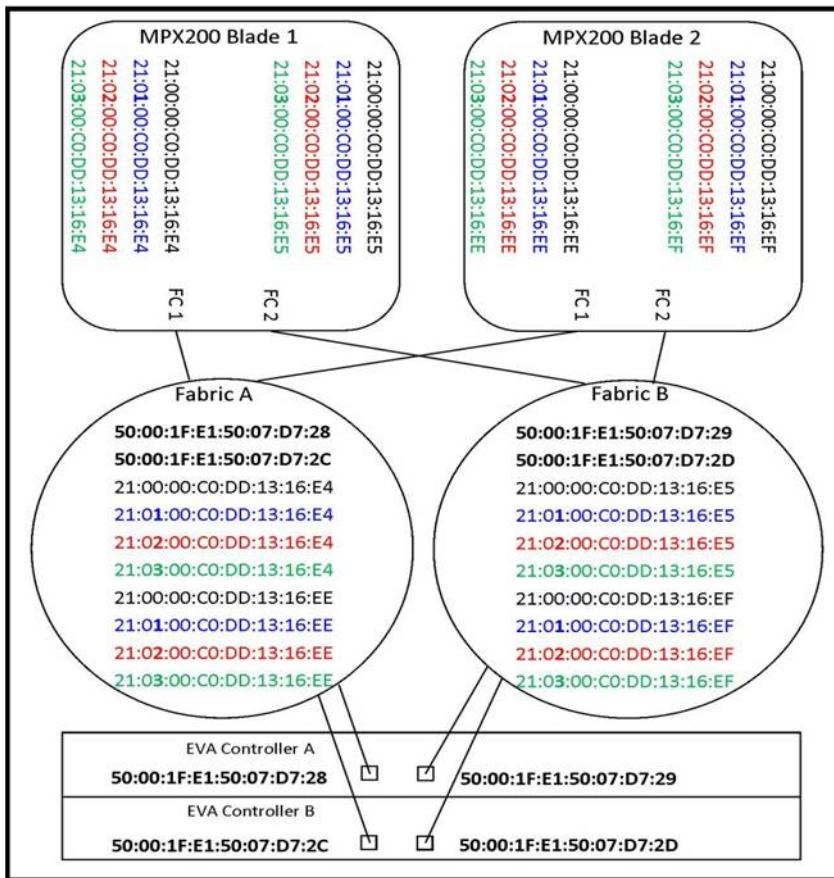
CAUTION: HP recommends that you use zoning if the MPX is in a mixed environment with FC initiators.

Fibre Channel switch-based zoning

Each FC port on the MPX200 uses NPIV to create a total of four unique, virtual WWNNs per physical FC port. To create proper zoning, you must understand the use of VPGs. A VPG consists of a WWNN from each of the four physical FC ports. This allows presentation for up to 1,024 LUNs from a single P6000 EVA or XP array.

Place an array target port in the same zone as one of the VPG ports (see “[EVA Fibre Channel zone configuration](#)” (page 32)). This ensures a single path to the FC port on the router blade and gives you more control of load balancing through the router.

Figure 19 EVA Fibre Channel zone configuration



HP P6000 Command View discovery

When the management port IP address is set and the router FC ports are visible to the P6000 EVA, you can perform the MPX200 discovery. You discover the MPX200 iSCSI controllers using the **Discover iSCSI Devices** button or the **Add iSCSI Device** button (see [Figure 20 \(page 33\)](#)).

Figure 20 iSCSI devices folder properties



NOTE: HP recommends that you set a static IP address on the management port to ensure connectivity.

After the discovery is complete, the MPX200s appear in the iSCSI Devices folder as iSCSI Controller 01 and iSCSI Controller 02. The four iSCSI MPX200 hosts appear in the Hosts folder (see Figure 21 (page 33)). The ports associated with each host consist of the VPGs from each blade.

Figure 21 Host properties

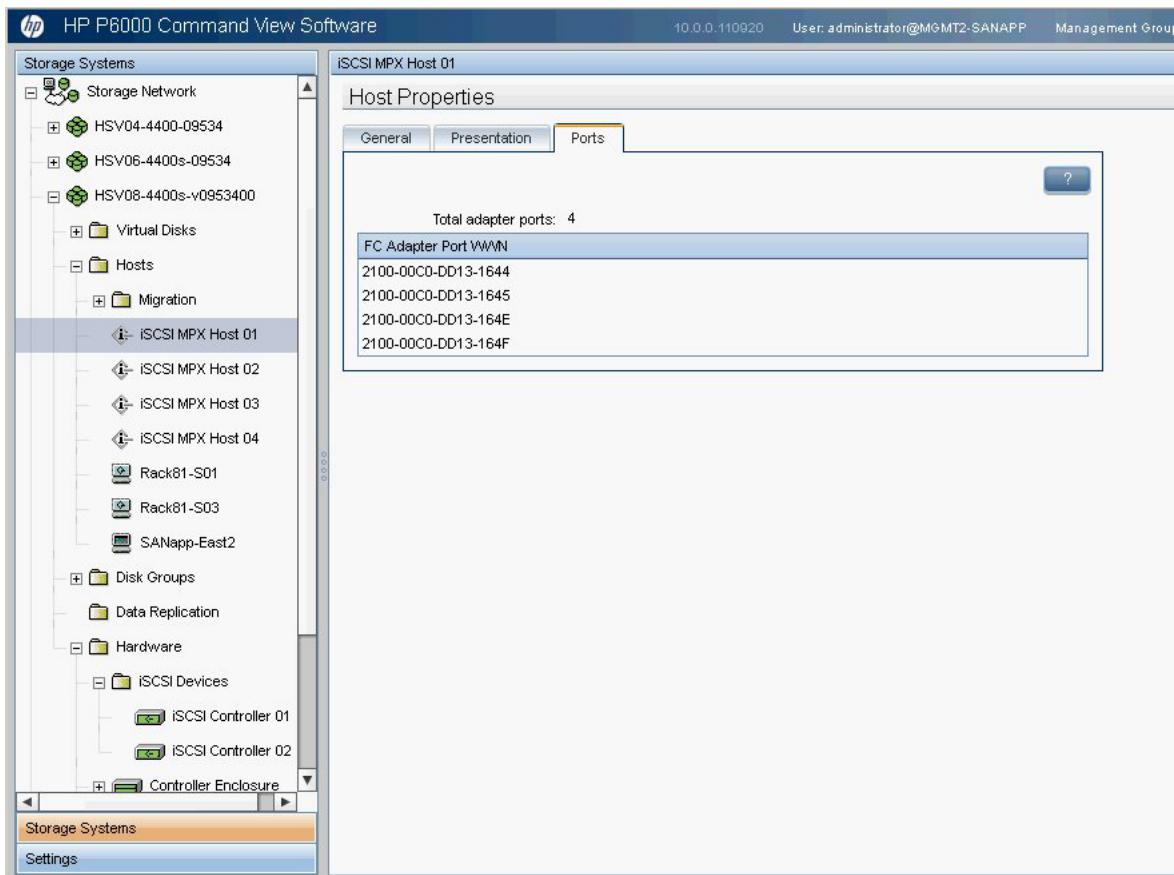
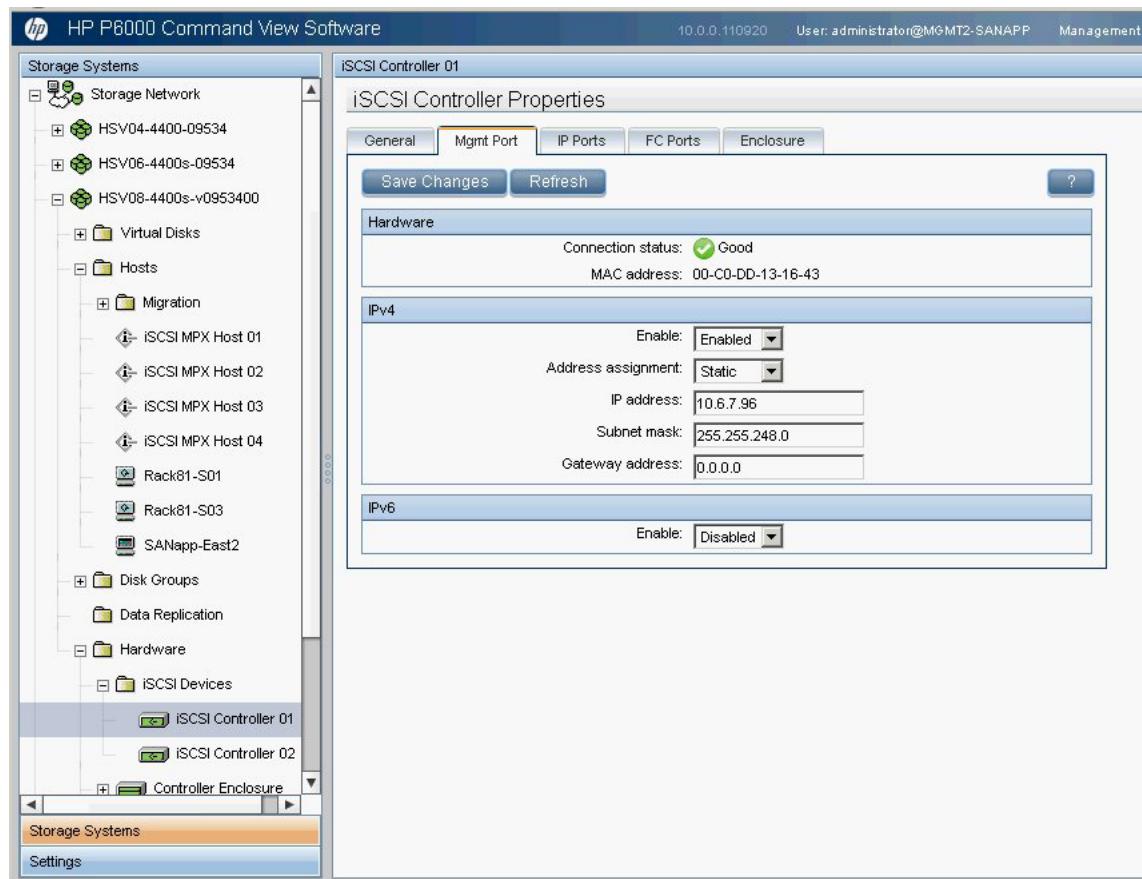


Figure 22 (page 34) shows the **iSCSI Controller Properties Mgmt Port** tab on the **iSCSI Controller Properties** page.

In the **IPv4** or **IPv6** box, select **Static** and set the management port IP address.

Figure 22 iSCSI controller properties: Mgmt Port tab

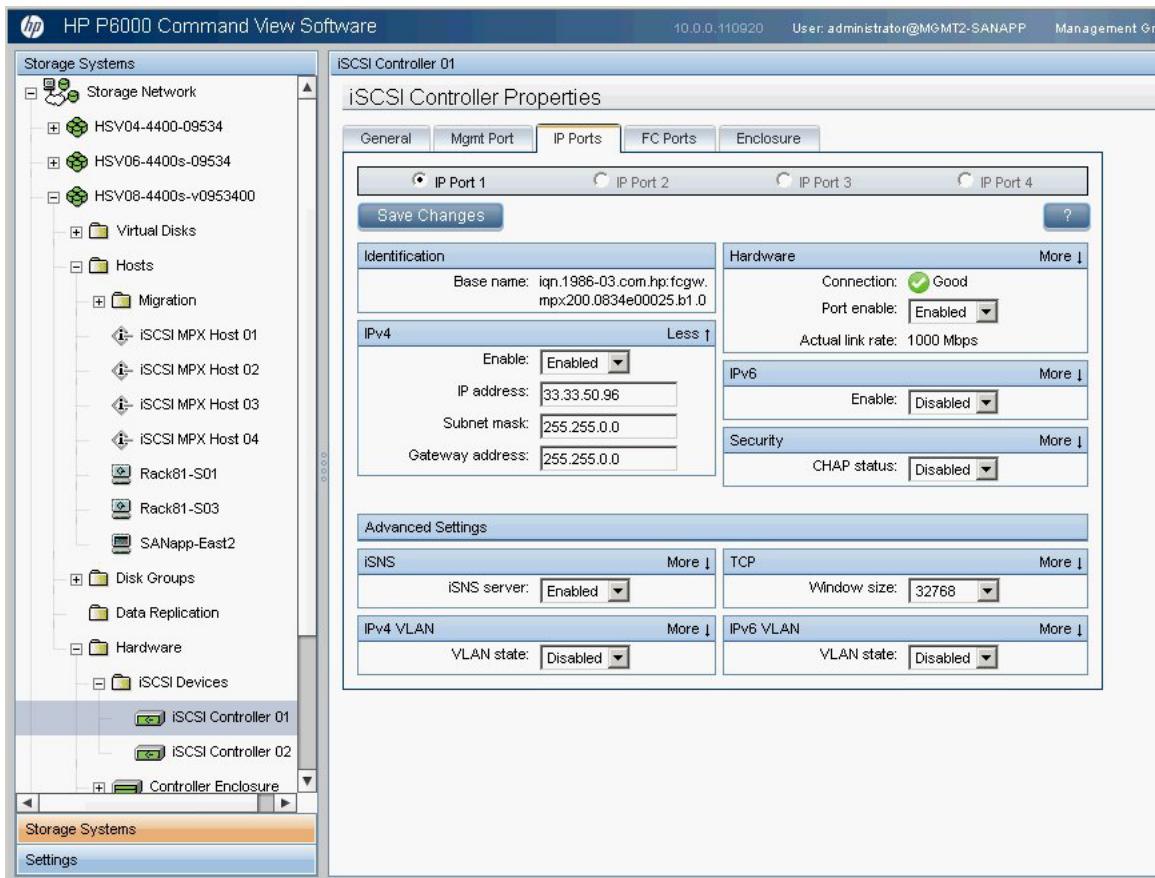


Setting up the iSCSI IP ports

Each iSCSI IP port must have an IP address—IPv4, IPv6, or both. Set the IP address on the IP Ports tab on the **iSCSI Controller Properties** page (see [Figure 23 \(page 35\)](#)).

NOTE: A target portal is created for each IP address that you set.

Figure 23 iSCSI controller properties: IP Ports tab

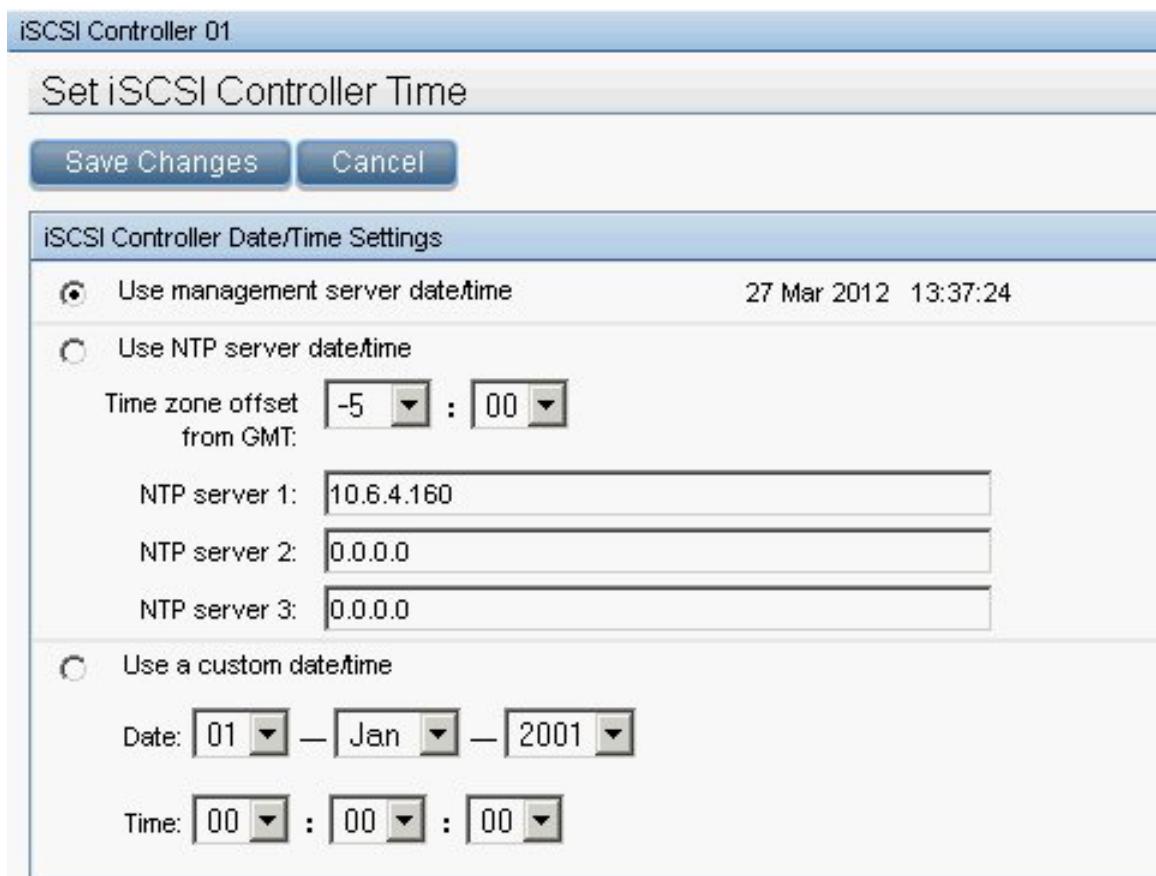


Setting the date and time on the MPX200

Setting the date and time on the MPX200 ensures the synchronization of events and assists in troubleshooting. You have three options for setting the date and time (see [Figure 24 \(page 36\)](#)).

NOTE: HP recommends using the NTP settings, if available on your network. This provides redundancy through multiple time servers.

Figure 24 Set iSCSI controller time



Code load

NOTE: HP recommends that you load the latest MPX200 firmware. See <http://www.hp.com/go/hpsc> for updates.

You load the firmware from the P6000 Command View Code Load page for the iSCSI controller. Firmware is loaded for the selected controller only; for a dual-blade configuration, you must perform this procedure for each blade.

1. Select the desired iSCSI controller.
2. Click **Code Load**.
3. Browse to the firmware file.
4. Click **Next Step**.
5. Click **Finish**.
6. In the dialog box, enter **yes**, and then click **Update**.

The MPX200 reboots upon successful load of the firmware.

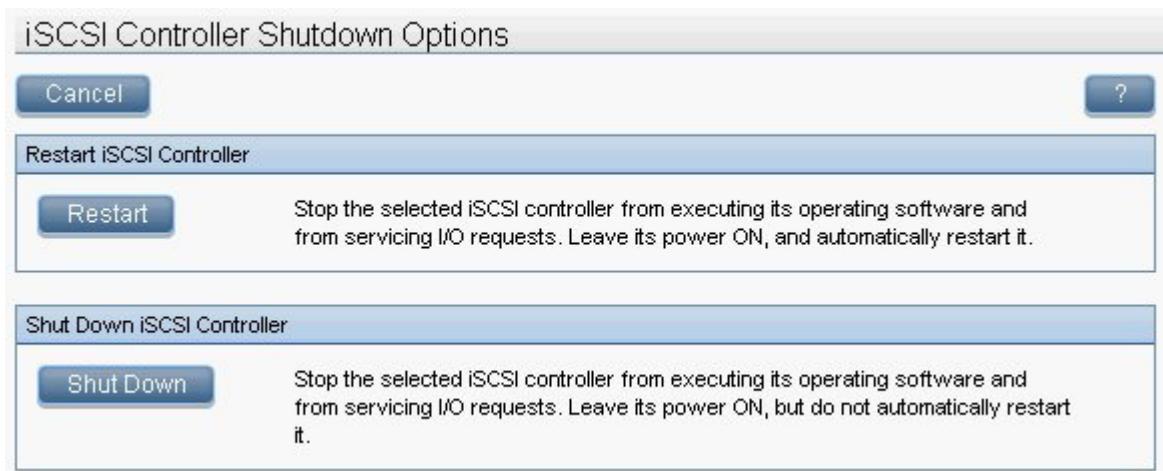
Figure 25 Code Load page for the iSCSI controller



Shutting down and restarting the MPX200

If you need to restart the MPX200, select the General tab, and then click **Restart**. If you need to shut down the MPX200, click **Shut down**. See [Figure 26 \(page 37\)](#).

Figure 26 iSCSI controller shutdown options



Saving or restoring the MPX200 configuration

After initial setup of the MPX200, it is a good practice to save the configuration. The FRU Save function allows you to save the configuration to a file that can be used later as a restoration point. The FRU Restore function allows you to restore the configuration to the point when the configuration was last saved, which is especially important for single-blade configurations.

NOTE: A Restore action reboots the blade.

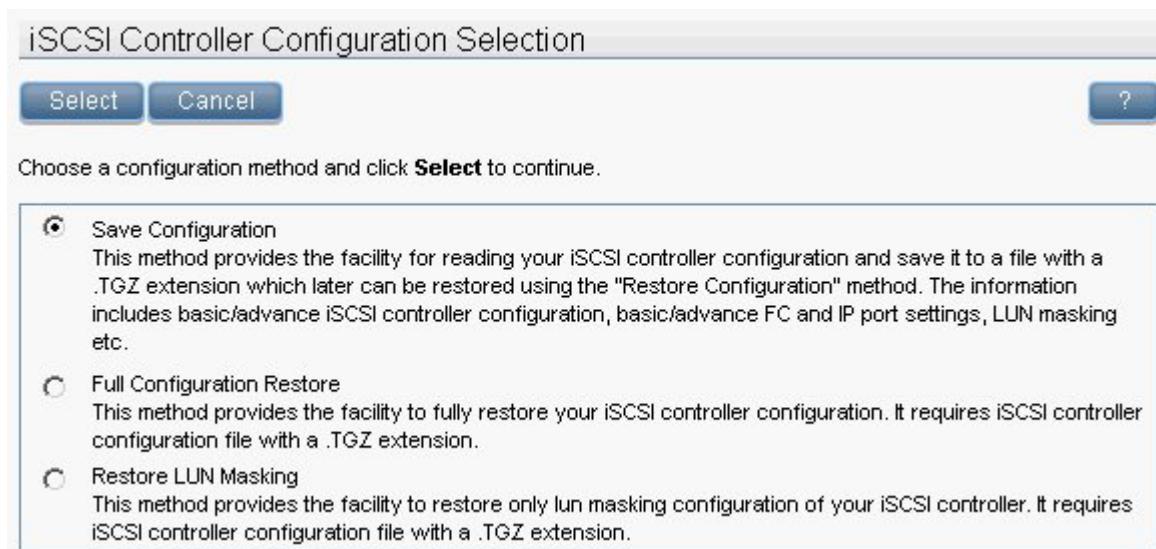
In a dual-blade configuration, a copy of the configuration for each router is kept on the peer. If you add a new blade, the configuration of the peer blade is copied to the new blade and is ready for use immediately; no reconfiguration is required.

To save or restore the MPX200 configuration:

1. Select the desired blade.

2. Click **Set Options**.
3. Click **Save Configuration**.
4. Select a configuration method, and then click **Select** (see [Figure 27 \(page 38\)](#)).

Figure 27 iSCSI controller configuration selection

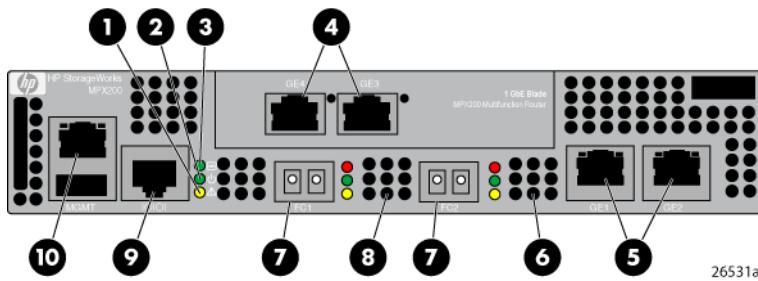


Locating the MPX200

A flashing blue LED in the center of the blade indicates that the locating beacon is on.

NOTE: The beacon turns off after 15 minutes.

Figure 28 Blue LED locating beacon



1. Input fault LED	2. System power LED
3. Heartbeat LED	4. 1-GbE or 10-GbE iSCSI ports
5. 1-GbE iSCSI ports	6. Maintenance button
7. 8-Gb/s FC ports	8. UID beacon (blue LED)
9. RS-232 port	10. Management port 10/100/1000 Ethernet

To enable or disable the locating beacon:

1. Select the iSCSI controller.
2. Click **Locate**.
3. Click **Locate ON** or **Locate OFF**, and then click **OK** ([Figure 29 \(page 39\)](#)).

Figure 29 Locate hardware device



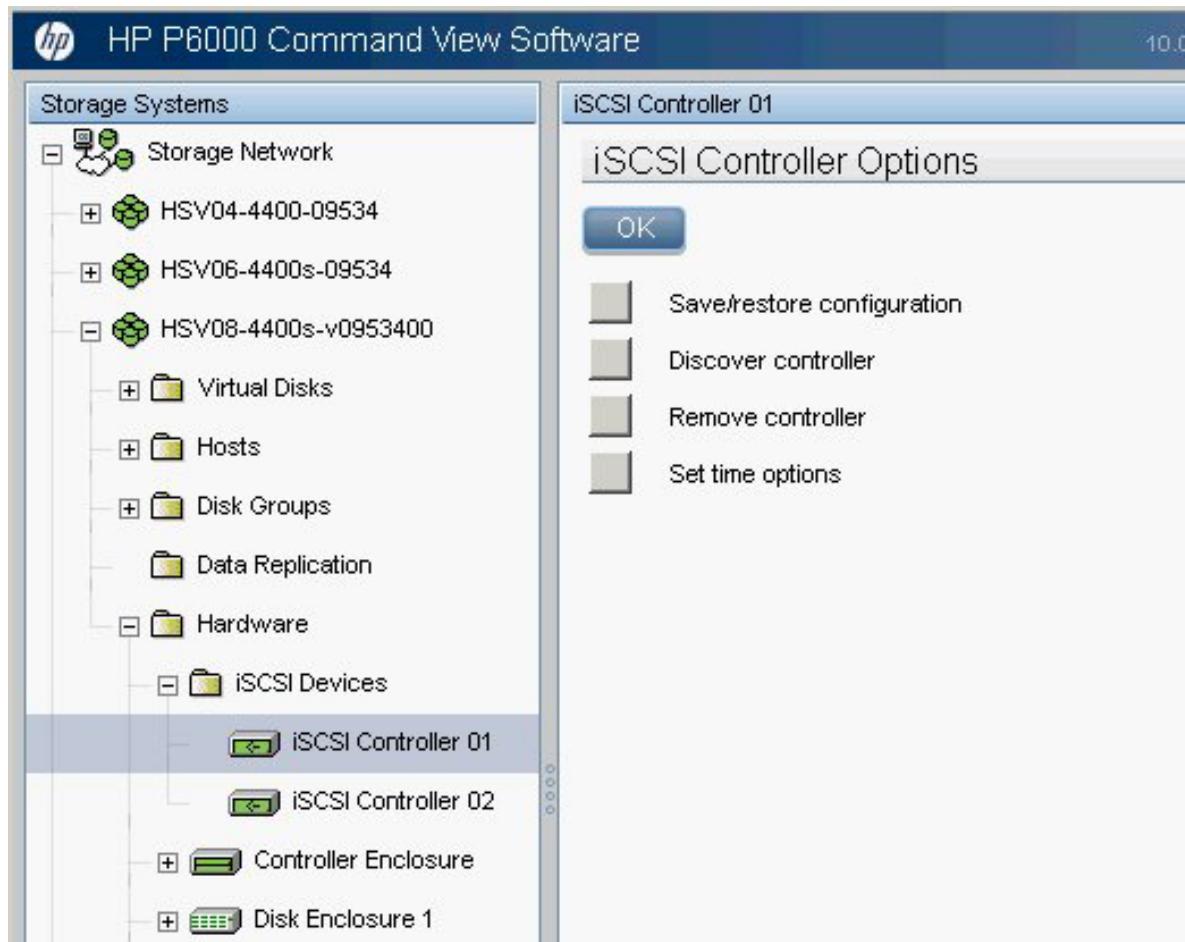
Removing an iSCSI controller

Before you remove an iSCSI controller permanently, ensure that all virtual disk presentations have been removed.

To remove an iSCSI controller:

1. Select the iSCSI controller.
2. Click **Set Options**.
3. Select **Remove controller**, and then click **OK**. (see [Figure 30 \(page 39\)](#)).

Figure 30 iSCSI controller options: Remove controller



5 Managing MPX200 iSCSI for 3PAR StoreServ Storage

This chapter describes management procedures for configuring and managing MPX200 iSCSI with 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class Storage. For more information, see “MPX200 iSCSI configuration rules and guidelines” (page 52).

Setting up the MPX200 management port

Access to the MPX200 CLI is required for initial setup. Connect to the CLI through one of the following:

- RS-232 serial port (115200/8/n/1)
- Telnet
- SSH

When connected, select the blade to manage by using the `blade <1 | 2>` command.

By default, the management port obtains a DHCP address. If the management port cannot obtain a DHCP address, you must set a static IP address. HP highly recommends using static IP addresses to retain connectivity. See [Figure 31 \(page 40\)](#).

Figure 31 The `blade #` command

```
login as: guest
guest@10.6.7.154's password:

*****
*          HP StorageWorks MPX200
*
*****


MPX200 #> blade 1
MPX200 <1> #> █
```

Enter the `admin start` command to change settings. See [Figure 32 \(page 40\)](#).

Figure 32 The `admin start` command

```
MPX200 <1> #> admin start
Start an admin session to
Password      : *****←      modify.
                                         The password is "config"
MPX200 <1> (admin) #> █
```

Enter the `set mgmt` command to setup the management port IP address. See [Figure 33 \(page 41\)](#).

Figure 33 The set mgmt command.

```
MPX200 <1> (admin) #> set mgmt

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:
The following command might cause a loss of connections to the MGMT port.

IPv4 Interface (0=Enable, 1=Disable) [Enabled]
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Static]
IPv4 Address [10.6.7.154]
IPv4 Subnet Mask [255.255.240.0]
```

Setting up the iSCSI ports

The iSCSI ports require an IP address. Enter the `set iscsi` command to set the IP addresses. See [Figure 34 \(page 41\)](#).

Figure 34 The set iscsi command

```
MPX200 <1> (admin) #> set iscsi ← To set the IP addresses on each iSCSI port.

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

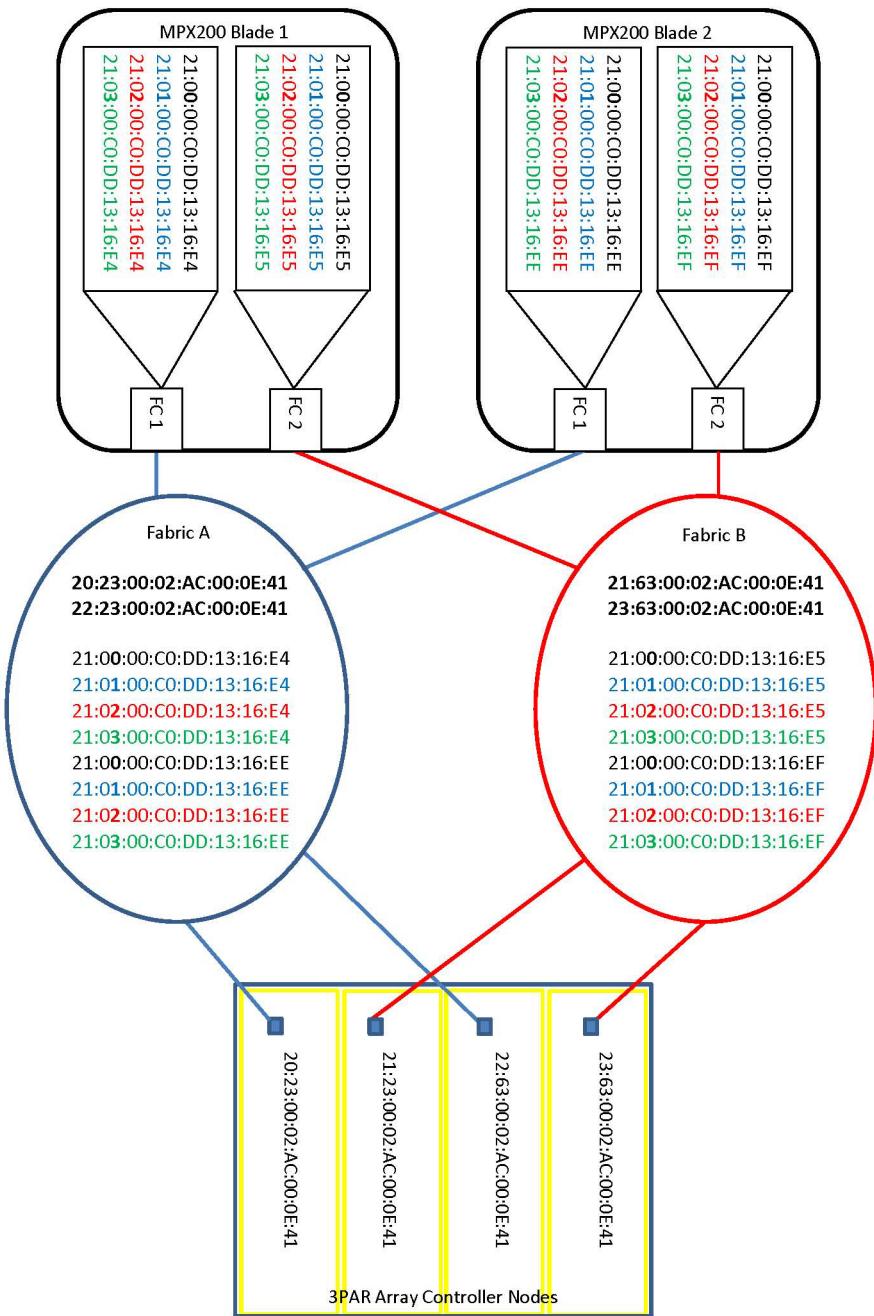
WARNING:
The following command might cause a loss of connections to both ports.

Configuring iSCSI Port: 1
-----
Port Status (0=Enable, 1=Disable) [Enabled]
```

Fibre Channel zoning

Use the following diagram as a guide to implement zones. Use the `show vpgroups` command to determine the MPX200 WWNs used in zoning (see [Figure 35 \(page 42\)](#)). Zones include WWNs from the MPX200 and the 3PAR array ports.

Figure 35 3PAR zoning



NOTE: Arrays can connect to each fabric multiple ways. HP recommends a connection to each fabric from different controller nodes at minimum.

LUN provisioning

LUN masking for MPX200 connectivity to a 3PAR array is accomplished by executing the following procedure in which the MPX200 is treated as if it were a Windows FC host to the 3PAR array.

NOTE: To properly set up LUN masking, you must create a host that includes the WWNs from a single VPG.

- Run the `show vpgroups` command and observe the fourth bit in the output to identify the WWNs belonging to a VPG. See [Figure 36 \(page 43\)](#).

Figure 36 The `show vpgroups` command

```

10.6.6.56 - PuTTY
MPX200 <1> #> show vpgroups

VpGroup Information
-----
Index          1
VpGroup Name   VPGROUP_1
Status         Enabled
WWPNs          21:00:00:c0:dd:13:ae:b6
                21:00:00:c0:dd:13:ae:b7

Index          2
VpGroup Name   VPGROUP_2
Status         Enabled
WWPNs          21:01:00:c0:dd:13:ae:b6
                21:01:00:c0:dd:13:ae:b7

Index          3
VpGroup Name   VPGROUP_3
Status         Enabled
WWPNs          21:02:00:c0:dd:13:ae:b6
                21:02:00:c0:dd:13:ae:b7

Index          4
VpGroup Name   VPGROUP_4
Status         Enabled
WWPNs          21:03:00:c0:dd:13:ae:b6
                21:03:00:c0:dd:13:ae:b7

MPX200 <1> #>
  
```

- Using the InForm Management Console, create a host and add only WWNs that belong to the same VPG.

There can be up to four hosts that represent the MPX200.

NOTE: [Figure 37 \(page 43\)](#) shows an example with eight connections from the MPX200 to the array. Each of the four FC ports detects two array ports.

Figure 37 Host properties

Name	System	Host Ports	InServ Ports	Node ID(s)	Persona	Volumes Exported	Total Exported Size (GiB)
MPX200-656-660-VPG1	3PAR-TITAN	4	4	0,1	2 - Generic-ALUA	8	345.000

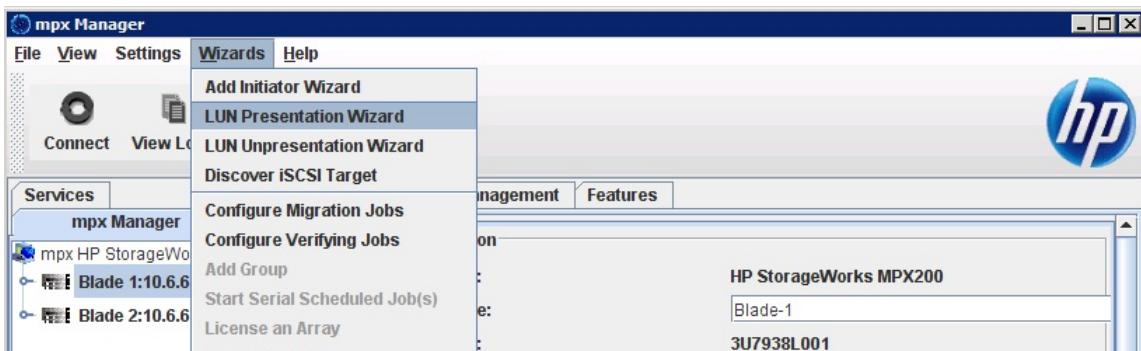
General				Paths			
Name	ID	Domain	Set	Host WWN/iSCSI Name	Type	Port	iSCSI IP Address
MPX200-656-660-VPG1	29	MPX200-iscsi-V-Class	--	210000C0DD13AEB7	Fibre Channel	1:6:3	n/a
				210000C0DD13AEB6	Fibre Channel	1:2:3	n/a
				210000C0DD13AEC1	Fibre Channel	1:6:3	n/a
				210000C0DD13AEC0	Fibre Channel	1:2:3	n/a
				210000C0DD13AEB7	Fibre Channel	0:2:3	n/a
				210000C0DD13AEB6	Fibre Channel	0:6:3	n/a
				210000C0DD13AEC0	Fibre Channel	0:6:3	n/a
				210000C0DD13AEC1	Fibre Channel	0:2:3	n/a

3. Perform a Discovery of an iSCSI port on each MPX200 blade from the initiator to register the initiator IQN.
4. Download, install, and run the mpx Manager.

NOTE: Although you can accomplish LUN masking using either the mpx Manager GUI or the command line, the mpx Manager is the preferred method.

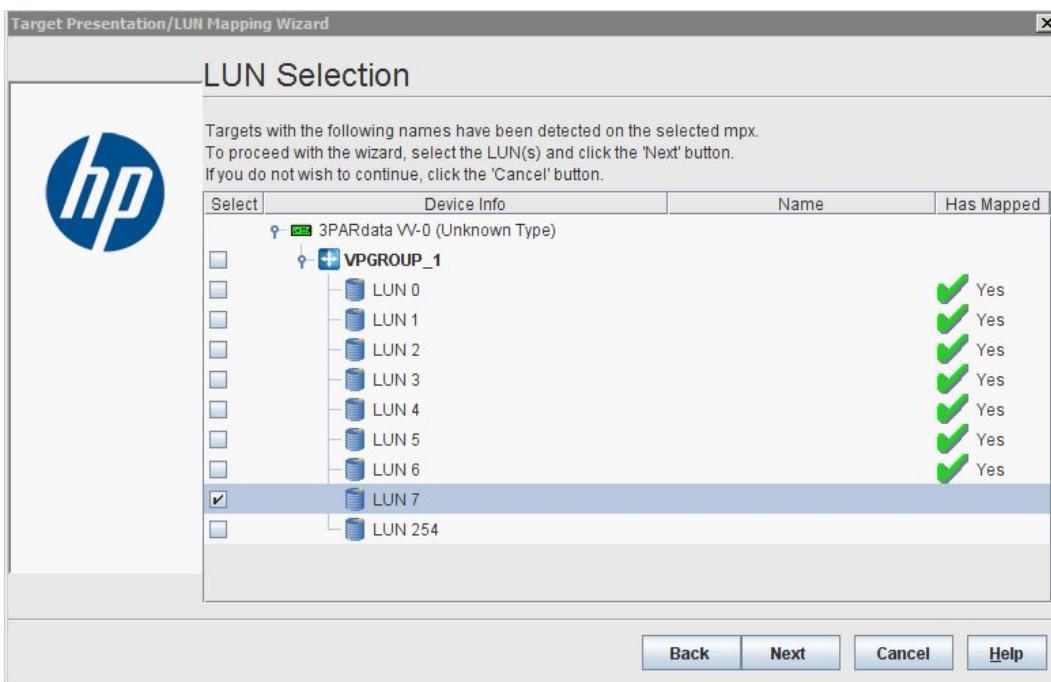
5. Connect to the management port of one of the blades.
6. Select the blade, and then select **Wizards**→**LUN Presentation Wizard** to start LUN Presentation Wizard. This must be done for each blade. See [Figure 38 \(page 44\)](#).

Figure 38 mpx Manager LUN Presentation Wizard



7. Select the initiator, and then click **Next**.
The selected array appears in a LUN Selection window.
8. Expand the tree, select the LUN that you want to present, and then click **Next**. See [Figure 39 \(page 44\)](#).

Figure 39 LUN Selection window

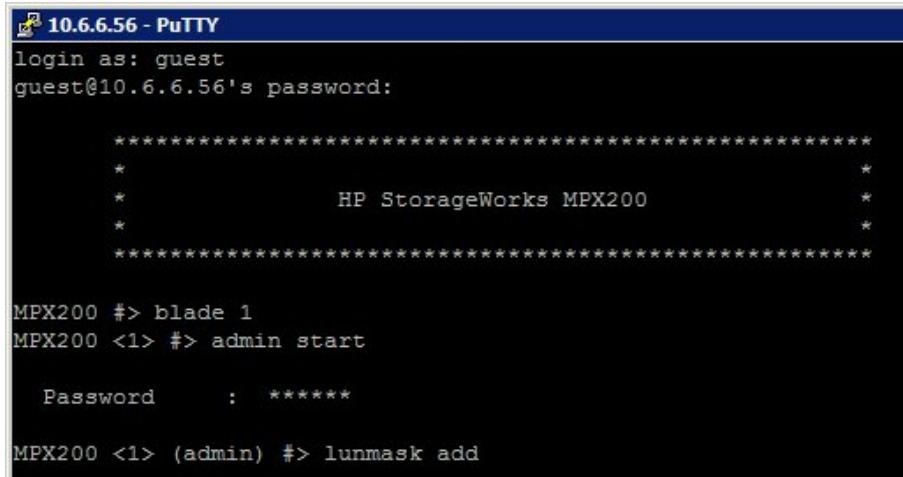


9. Click **Finish** to complete the LUN presentation for the selected blade.
10. Repeat [Step 6](#) through [Step 9](#) for each blade.

Alternate procedure

Alternately, you can perform CLI based LUN presentation using the `lunmask add` command. See [Figure 40 \(page 45\)](#). Be sure to run this command for each 3PAR target port on each blade.

Figure 40 The `lunmask add` command



```
10.6.6.56 - PuTTY
login as: guest
guest@10.6.6.56's password:

*****
*          HP StorageWorks MPX200
*
*****
MPX200 #> blade 1
MPX200 <1> #> admin start

Password      : *****

MPX200 <1> (admin) #> lunmask add
```

Setting up the iSCSI initiator

For instructions to configure the iSCSI host, see the HP 3PAR Implementation Guide that pertains to your operating system, available at <http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?lang=en&cc=us&prodClassId=-1&contentType=SupportManual&docIndexId=64255&prodTypId=18964&prodSeriesId=5044394>.

NOTE: Multipath software is required when logging in to multiple connections.

For Windows-specific settings, see “[Microsoft Windows iSCSI initiator rules and guidelines](#)” (page 56).

6 Managing MPX200 iSCSI for XP24000/20000

This chapter describes management procedures for configuring and managing MPX200 iSCSI with XP24000/20000 storage systems. For more information, see “[MPX200 iSCSI configuration rules and guidelines](#)” (page 52).

Setting up the MPX200 management port

Access to the MPX200 CLI is required for initial setup. Connect to the CLI through one of the following:

- RS-232 serial port (115200/8/n/1)
- Telnet
- SSH

By default, the management port obtains a DHCP address. If the management port cannot obtain a DHCP address, you must set a static IP address. HP highly recommends using static IP addresses to retain connectivity.

When connected, select the blade to manage by using the blade <1 | 2> command (see Figure 41 (page 46)).

Figure 41 The `blade #` command

```
MPX200 #> blade 1
MPX200 <1> #> show mgmt

Management Port Information
-----
IPv4 Interface      Enabled
IPv4 Mode           Static ← Set a static IP Address
IPv4 IP Address    10.6.7.154
IPv4 Subnet Mask   255.255.240.0
IPv4 Gateway        0.0.0.0
IPv6 Interface      Disabled
Link Status         Up
MAC Address         00-c0-dd-13-16-e3

MPX200 <1> #> █
```

Use the `admin start` command to change settings (see Figure 42 (page 46)).

Figure 42 The `admin start` command

```
MPX200 <1> #> admin start
Password      : ***** ← Start an admin session to
                           modify.
                           The password is "config"
MPX200 <1> (admin) #> █
```

Use the `set mgmt` command to setup the management port IP address (see Figure 43 (page 47)).

Figure 43 The set mgmt command.

```
MPX200 <1> (admin) #> set mgmt

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:
The following command might cause a loss of connections to the MGMT port.

IPv4 Interface (0=Enable, 1=Disable) [Enabled      ]
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Static      ]
IPv4 Address [10.6.7.154      ]
IPv4 Subnet Mask [255.255.240.0      ] █
```

Setting up the iSCSI ports

The iSCSI ports require an IP address. Use the set iscsi command (see [Figure 44 \(page 47\)](#)).

Figure 44 The set iscsi command

```
MPX200 <1> (admin) #> set iscsi ← To set the IP addresses on each iSCSI port.

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:
The following command might cause a loss of connections to both ports.

Configuring iSCSI Port: 1
-----
Port Status (0=Enable, 1=Disable) [Enabled      ] █
```

Fibre Channel zoning

See “[Fibre Channel zoning](#)” (page 31) and “[Fibre Channel switch-based zoning](#)” (page 32) for zoning information.

WWNs used in zoning can be found in the MPX200 using the `show vpgroups` command (see [Figure 45 \(page 48\)](#)).

Figure 45 The show vpgroup command

```
MPX200 <1> #> show vpgroups
VpGroup Information
-----
Index          1
VpGroup Name  VPGROUP_1
Status         Enabled
WWPNs          21:00:00:c0:dd:13:16:e4
                21:00:00:c0:dd:13:16:e5
Index          2
VpGroup Name  VPGROUP_2
Status         Enabled
WWPNs          21:01:00:c0:dd:13:16:e4
                21:01:00:c0:dd:13:16:e5
Index          3
VpGroup Name  VPGROUP_3
Status         Enabled
WWPNs          21:02:00:c0:dd:13:16:e4
                21:02:00:c0:dd:13:16:e5
Index          4
VpGroup Name  VPGROUP_4
Status         Enabled
WWPNs          21:03:00:c0:dd:13:16:e4
                21:03:00:c0:dd:13:16:e5
```

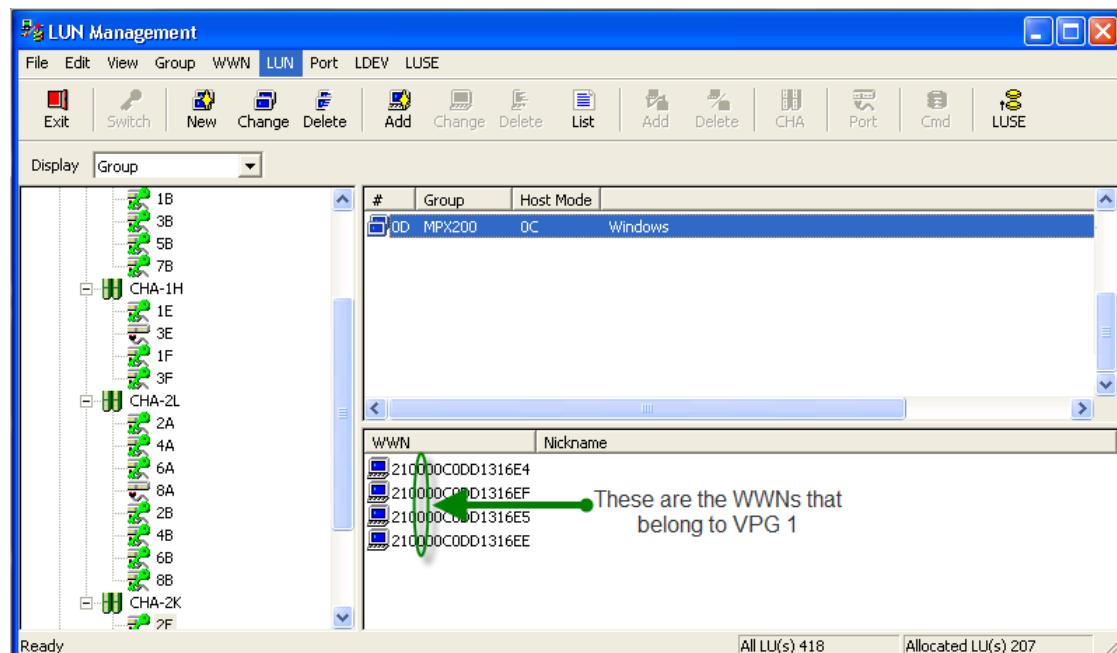
This bit identifies the Virtual Port Group.

LUN management

LUN masking for MPX200 connectivity to XP is accomplished by executing the following procedure. The MPX200 is treated as if it were a Windows FC host to the XP.

1. To properly setup LUN masking, create a group that includes the WWNs from a single VPG. To identify which WWNs belong to a VPG see the fourth bit (circled in [Figure 46 \(page 49\)](#)). You can create up to four groups, each containing WWNs from each VPG from each MPX200 blade. LUNs can be created and assigned to the groups at this time.

Figure 46 LUN management window



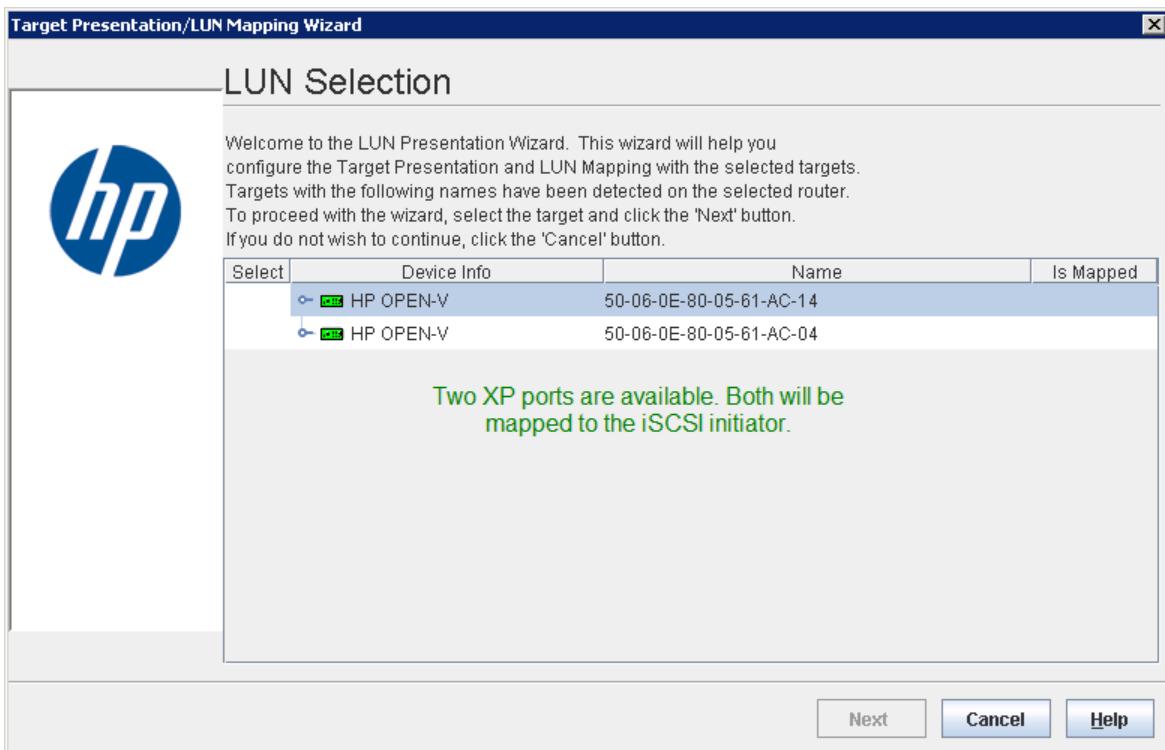
2. Install the Microsoft iSCSI Initiator software. For Windows Server 2008, the iSCSI initiator is included with the operating system.

For Windows Server 2003, you must install the iSCSI initiator. For Windows Server 2003, the Microsoft iSCSI initiator installation presents an option for installing MPIO using the Microsoft generic DSM (**Microsoft MPIO Multipathing Support for iSCSI** check box). For Windows Server 2008, MPIO is installed separately as a feature.

3. See "[Setting up the iSCSI initiator](#)" (page 58) to set up the Windows host and register the IQN name.
4. Install and run the mpx Manager.
5. Start the Presentation Wizard by selecting Wizards from the menu.

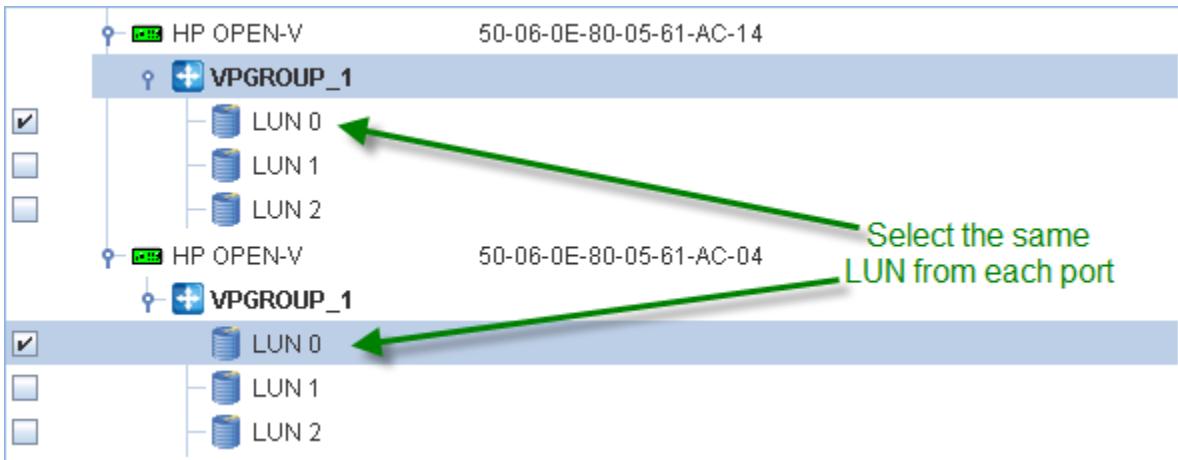
The LUN Presentation Wizard will display the XP target ports (see [Figure 47 \(page 50\)](#)).

Figure 47 LUN Selection window



6. Expand the desired ports and select the same LUN from each (see Figure 48 (page 50)).

Figure 48 Expanded ports



7. Select the initiator and finish (see Figure 49 (page 51)).

Figure 49 Select the Initiators

Select the Initiators for the LUN Presentation.

To proceed with the wizard, select the initiators and click the 'Next' button.
If you do not wish to continue, click the 'Cancel' button.

Select	Initiator Information	Protocol
<input checked="" type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm2.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm3.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm4.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm5.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm6.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm7.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1991-05.com.microsoft:rack81-s16-vm8.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1987-05.com.cisco:rack05-s01.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1987-05.com.cisco:rack05-s02.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1987-05.com.cisco:rack05-s03.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.1987-05.com.cisco:rack05-s04.sandbox.com	iSCSI
<input type="checkbox"/>	iqn.2000-04.com.qlogic:qle4062c.rack05-s05.sandbox.com.1	iSCSI
<input type="checkbox"/>	iqn.2000-04.com.qlogic:qle4062c.rack05-s05.sandbox.com.2	iSCSI
<input type="checkbox"/>	iqn.2000-04.com.qlogic:qle4062c.rack05-s05.sandbox.com.3	iSCSI

[Back](#) [Next](#) [Cancel](#) [Help](#)

8. Follow the steps beginning with [Step 5](#) to log in to the target.

7 MPX200 iSCSI configuration rules and guidelines

This chapter describes the iSCSI configuration rules and guidelines for the MPX200.

iSCSI rules and supported maximums

The MPX200 chassis can be configured with one or two blades. Dual-blade configurations provide for high availability with failover between blades, and are supported as redundant pairs only. iSCSI-connected servers can be configured for access to one or both blades.

NOTE: In the event of a failover between blades, servers with single-blade connectivity to a failed blade will no longer have connectivity to the MPX200.

Table 6 (page 52) lists the supported maximums.

Table 6 Supported MPX200 iSCSI maximums

Description	Maximum per MPX200 solution ¹
Hardware	
3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, P6000 EVA and/or XP24000/20000 storage systems	4 total (any combination)
MPX200	One chassis with up to 2 blades
MPX200 iSCSI port connections	See “MPX200 supported configuration maximums” (page 21).
Configuration parameter	
Total number of iSCSI initiators	300 per chassis for 1-GbE (1 or 2 blades) 600 per chassis for 10-GbE (1 or 2 blades)
Total number of iSCSI LUNs	4,096 per chassis, 1,024 per P6000 EVA or XP
iSCSI connections, 1-GbE	1,024 per blade, 2,048 per chassis
iSCSI connections, 10 GbE	2,048 per blade, 4,096 per chassis

¹ For mixed-blade chassis configurations that include one 1-GbE blade and one 10-GbE blade, the maximums supported are the 1-GbE blade values.

P6000 EVA storage system rules and guidelines

The MPX200 is supported for iSCSI with the following P6000 EVA storage systems:

- EVA4400/4400 with embedded switch
- EVA4000/4100/6000/6100/8000/8100
- EVA6400/8400
- P63x0/P65x0

All MPX200 configurations must follow these P6000 EVA connectivity rules:

- All MPX200 Fibre Channel connections are supported for fabric-connect or direct-connect configurations.
- Each P6000 EVA storage system can connect to a maximum of one MPX200 chassis (two blades).
- Each P6000 EVA controller host port can connect to a maximum of two MPX200 Fibre Channel ports.

- A maximum of one MPX200 chassis (two blades) can be zoned with up to four P6000 EVA storage systems.
- A P6000 EVA storage system can present LUNs to iSCSI initiators and Fibre Channel hosts concurrently.

HP P6000 Command View management rules and guidelines

The HP P6000 Command View implementation for the MPX200 supports management of up to four P6000 EVA storage systems concurrently, and provides the equivalent functionality for both iSCSI and Fibre Channel connected servers. All MPX200 management functions are integrated in HP P6000 Command View.

① **IMPORTANT:** The MPX200 requires a specific controlled release of HP P6000 Command View. For more information and to receive the supported HP P6000 Command View version, contact your HP service representative.

The HP P6000 Command View management rules and guidelines follow:

- Requires HP P6000 Command View 9.2 or later for array-based and server-based management. FCoE requires Command View EVA 9.3 or later, P6300/P6500 requires 9.4 or later.
- A maximum of one MPX200 chassis (two blades) can be discovered by a P6000 EVA storage system.
- HP P6000 Command View manages the MPX200 out of band (IP) through the MPX200 management IP port. The HP P6000 Command View application server must be on the same IP network as the MPX200 management IP port.
- The MPX200 iSCSI initiator and iSCSI LUN masking information resides in the MPX200, not in the HP P6000 Command View database.
- The default iSCSI initiator P6000 EVA host-mode setting is Microsoft Windows. The iSCSI initiator host-mode setting for Apple Mac OS X, Linux, Oracle Solaris, VMware, and Windows 2008 is configured with HP P6000 Command View.
- iSCSI host mode setting for Windows 2012 is configured with MPX200 CLI only.

NOTE: Communication between HP P6000 Command View and the MPX200 is not secured by the communication protocol. If unsecured communication is a concern, HP recommends using a confined or secured IP network in the data center.

P6000 EVA storage system software

P6000 EVA storage system software supported for Fibre Channel hosts, such as HP P6000 Continuous Access, HP P6000 Business Copy, HP SSSU, and HP Replication Solutions Manager, are supported with the MPX200 for P6000 EVA LUNs that have been presented to iSCSI initiators. This section describes restrictions for iSCSI hosts using the MPX200.

Features supported for iSCSI hosts

The following Business Copy features are supported for iSCSI hosts:

- LUN snapshots presented to iSCSI hosts
- LUN snapclones (normal or 3-phase) presented to iSCSI hosts
- Instant restore from a snapclone to the original source
- Ability of iSCSI hosts to access and write to P6000 EVA snapshots and snapclones

- Use of HP P6000 Command View, SSSU, or RSM to create snapshots manually or automatically on a schedule
- CLI support to enter replication commands from iSCSI hosts

Features not supported for iSCSI hosts

LUNs that are presented to iSCSI hosts through the MPX200, and that require a host agent on the iSCSI initiator, do not support advanced replication features because there are no iSCSI replication host agents available. The following features are not supported for iSCSI hosts:

- Mounting and unmounting LUNs through a host agent, which must be performed manually
- Accessing the host view of storage (for example, viewing an F drive from a host)
- Deploying host agents to allow users to launch a script on the iSCSI host

[Table 7 \(page 54\)](#) describes support for P6000 EVA storage system software when using the MPX200 for iSCSI.

Table 7 Support for P6000 EVA storage system software with MPX200 iSCSI

HP storage product	MPX200 iSCSI support
HP P6000 Business Copy	iSCSI and Fibre Channel hosts are supported.
HP Replication Solutions Manager	
HP SSSU	
HP P6000 Continuous Access	iSCSI and Fibre Channel hosts and LUN remote replication are supported.
HP P6000 Continuous Access with HP-supported FCIP gateways	

3PAR StoreServ Storage system rules and guidelines

The MPX200 is supported for iSCSI with the following 3PAR storage systems:

- 3PAR StoreServ 10000/7000
- 3PAR F-Class, T-Class

All MPX200 configurations must follow these connectivity rules:

- When using the MPX200 for iSCSI, MPX200 FC connections can be fabric-attached through an FC switch or direct-connect to a 3PAR FC port.
- Multiple MPX200 chassis can be connected to a single 3PAR array. However, HP recommends that array FC ports are not shared between different chassis.
- HP recommends a maximum of eight 3PAR array ports be connected to a single MPX200 chassis.
- A maximum of one MPX200 chassis (two blades) can be zoned with up to four 3PAR storage systems.
- 3PAR, XP and P6000 EVA storage systems can connect to the same MPX200. The total allowable number of storage systems is four per MPX200 chassis.
- A 3PAR storage system can present LUNs to iSCSI initiators and FC hosts concurrently.

XP storage system rules and guidelines

The MPX200 is supported for iSCSI with the following XP storage systems:

- XP24000
- XP20000

All MPX200 configurations must follow these connectivity rules:

- When using the MPX200 for iSCSI, MPX200 FC connections must be fabric-attached through an FC switch.
- Each XP storage system can connect to a maximum of one MPX200 chassis (two blades).
- A maximum of one MPX200 chassis (two blades) can be zoned with up to four XP storage systems.
- XP and P6000 EVA storage systems can connect to the same MPX200, The total allowable number of storage systems is four per MPX200 chassis.
- An XP storage system can present LUNs to iSCSI initiators and FC hosts concurrently.

Fibre Channel switch and fabric support

The MPX200 is supported with HP B-series and C-series switch models.

For the latest information on Fibre Channel switch model and firmware support, see the HP SPOCK website at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

Operating system and multipath software support

This section describes the MPX200 iSCSI operating system, multipath software, and cluster support.

For the latest information on operating system and multipath software support, see SPOCK at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access

Table 8 (page 55) describes P6000 EVA operating system and multipath software support.

Table 8 P6000 EVA operating system and multipath software support

Operating system	Multipath software	Clusters	P6000 EVA storage system
Apple Mac OS X	None	None	EVA4400/4400 with embedded switch
Microsoft Windows Server 2008, 2003, Hyper-V	MPIO with HP DSM MPIO with Microsoft DSM	MSCS	EVA4000/4100/6000/6100/8000/8100 EVA6400/8400 P6300/P6500
Microsoft windows 2012	MPIO with HPDSM, MSDSM	None	
Red Hat Linux, SUSE Linux	Device Mapper	None	
Solaris	Solaris MPxIO	None	
VMware	VMware MPxIO	None	

Table 9 (page 55) lists XP24000/20000 operating system and multipath software support.

Table 9 MPX200-XP operating system and multipath support

Operating system	Multipath software	XP storage system
Microsoft Windows Server 2008, 2003	MPIO with Microsoft DSM	XP24000/20000
Microsoft Windows 2012	MPIO with HPDSM, MSDSM	P95000

Table 10 (page 56) lists 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class operating system and multipath software support.

Table 10 HP 3PAR StoreServ Storage operating system and multipath software support

Operating system	Multipath software	Clusters	3PAR storage system
Windows Server 2003	MPIO with HP DSM ¹	MSCS	3PAR StoreServ 10000/7000, 3PAR F-Class, T-Class
Windows Server 2008	MPIO with MS DSM ¹	MSCS	
Windows Server 2012	MPIO with MS DSM	None	
VMware	VMware MPxIO ¹	N/A	
Red Hat, SUSE, Oracle Linux	Device Mapper ¹	N/A	

¹ See the HP 3PAR Implementation Guide that pertains to your operating system.

iSCSI initiator rules and guidelines

This section describes the iSCSI initiator rules and guidelines for Apple Mac OS, Microsoft Windows, Linux, Solaris, and VMware. General iSCSI initiator rules and guidelines follow:

- iSCSI initiators and MPX200 iSCSI ports can be in different IP subnets. This requires setting the MPX200 iSCSI gateway feature. For more information, see ["MPX200 configuration options for P6000 EVA" \(page 15\)](#) and ["Command Line Interface usage" \(page 195\)](#).
- Both single-path and multipath initiators are supported on the same MPX200.
- Fibre Channel LUNs and iSCSI LUNs are not supported on the same server.

Apple Mac OS X iSCSI initiator rules and guidelines

The Apple Mac OS X iSCSI initiator supports the following:

- Power PC and Intel Power Mac G5, Xserve, Mac Pro
- ATTO Technology Mac driver
- iSNS
- CHAP

iSCSI initiator operating system considerations follow:

- Host-mode setting—Apple Mac OS X
- Multipathing—Not supported

Microsoft Windows iSCSI initiator rules and guidelines

The Microsoft Windows iSCSI initiator supports the following:

- Microsoft iSCSI initiator versions 2.08 and 2.07
- Microsoft iSCSI Initiator for Windows 2012, 2008, Vista, and Windows 7
- Multipath on MPX200 single-blade or dual-blade configurations

iSCSI initiator operating system considerations:

- Host-mode setting—Microsoft Windows 2012, 2008, or Windows 2003

Windows iSCSI Initiator Settings:

NOTE: These parameters are not required if Windows is running in a virtualized environment where the host is providing storage to the guest.

- **TCPIP parameter**—Tcp1323Opts must be entered in the registry with a value of DWord=2 under the registry setting
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters.
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\ParametersTcp1323Opts=2
- **TimeOutValue parameter**—Enter this parameter in the registry with a value of DWord=120 under the registry setting HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Disk.
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\DiskTimeOutValue=120

△ **CAUTION:** Using the Registry Editor incorrectly can cause serious problems that may require reinstallation of the operating system. Use Registry Editor at your own risk. Back up the registry before you make any changes.

NOTE: The registry parameters are set automatically by the HP StorageWorks MPX200 for Enterprise Virtual Array Windows software kit, which is available at <http://h18006.www1.hp.com/products/storageworks/evaiscscsconnect/index.html>.

Linux iSCSI initiator rules and guidelines

The Linux iSCSI initiator supports the following:

- Red Hat Linux and SUSE Linux
- Multipath using HP Device Mapper

iSCSI initiator operating system considerations:

- Host-mode setting—Linux
- NIC bonding—Not supported

Solaris iSCSI initiator rules and guidelines

The Solaris iSCSI initiator supports the following:

- Solaris iSCSI initiator only
- Multipath using MPxIO
- MPxIO Symmetric option only
- MPxIO round-robin
- MPxIO auto-failback

iSCSI initiator operating system considerations:

- Host-mode setting—Solaris
- TOE NICs or iSCSI HBA—Not supported
- IUN 0—Not supported

VMware iSCSI initiator rules and guidelines

The VMware iSCSI initiator supports the following:

- Native iSCSI initiator in VMware ESX 4.0/3.5
- Guest OS SCSI controller, LSI Logic and/or Bus Logic (Bus Logic with SUSE Linux only)
- ESX server native multipath solution, based on NIC teaming on the server

- Guest OS boot from an MPX200 iSCSI device
- VMFS data stores and raw device mapping for guest OS virtual machines
- Multi-initiator access to the same LUN via VMFS
- VMware ESX server 4.0/3.5 native multipath solution based on NIC teaming

iSCSI initiator operating system considerations:

- Host-mode setting—VMware
- Hardware iSCSI initiator (iSCSI HBA)—Not supported

Supported IP network adapters

For the latest information on IP network adapter support, see the product release notes or SPOCK at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

Table 11 (page 58) lists the IP network adapters supported by the MPX200.

Table 11 Supported IP network adapters

Operating system	Network interconnect
Apple Mac OS X	All standard GbE NICs/ASICs supported by Apple
Microsoft Windows Server 2012, 2008, 2003, Hyper-V	All standard 1 Gbe or 10 GbE NICs/ASICs and TOE NICs supported by HP for Windows 2012, 2008 and 2003 QLogic iSCSI HBAs
Red Hat Linux, SUSE Linux	All standard 1 Gbe or 10 GbE NICs/ASICs supported by HP for Linux QLogic iSCSI HBAs
Solaris	All standard GbE NICs/ASICs supported by Sun
VMware	All standard 1 Gbe or 10 GbE NICs/ASICs supported by HP for VMware QLogic iSCSI HBAs

IP network requirements

HP requires the following:

- Network protocol: TCP/IP IPv6 or IPv4, Ethernet 1,000 Mb/s or 10 GbE

NOTE: If you configure IPv6 on any MPX200 iSCSI port, you must also configure IPv6 on the HP Command View management server.

- IP data—LAN/VLAN supported with less than 10 ms latency; maximum of two VLANs per port, one VLAN per protocol
- IP management—LAN/WAN supported
- Dedicated IP network for iSCSI data

HP recommends the following:

- Jumbo frames

Setting up the iSCSI initiator

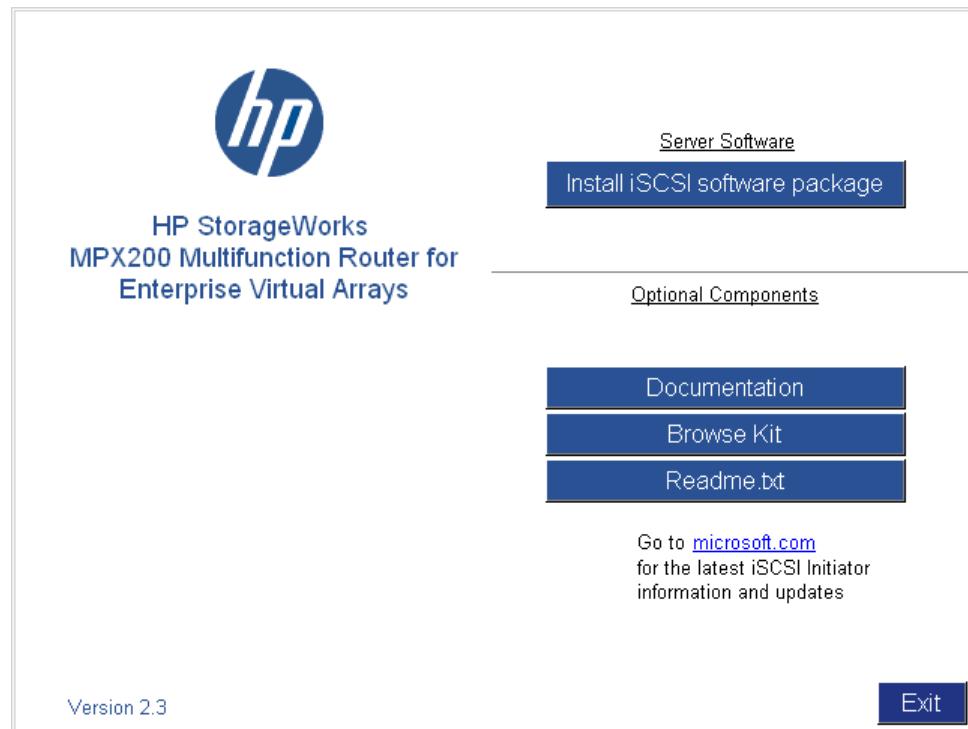
This section explains how to set up the iSCSI initiator.

Windows Server iSCSI initiator

For Windows Server 2012, 2008, the iSCSI initiator is included with the operating system. For Windows Server 2003, you must download and install the iSCSI initiator (version 2.08 recommended).

1. Install the HP StorageWorks MPX200 iSCSI kit.
 - a. Start the installer by running `Launch.exe`. (If you are using a CD-ROM, the installer should start automatically.)
 - b. Click **Install iSCSI software package**. See [Figure 50 \(page 59\)](#).

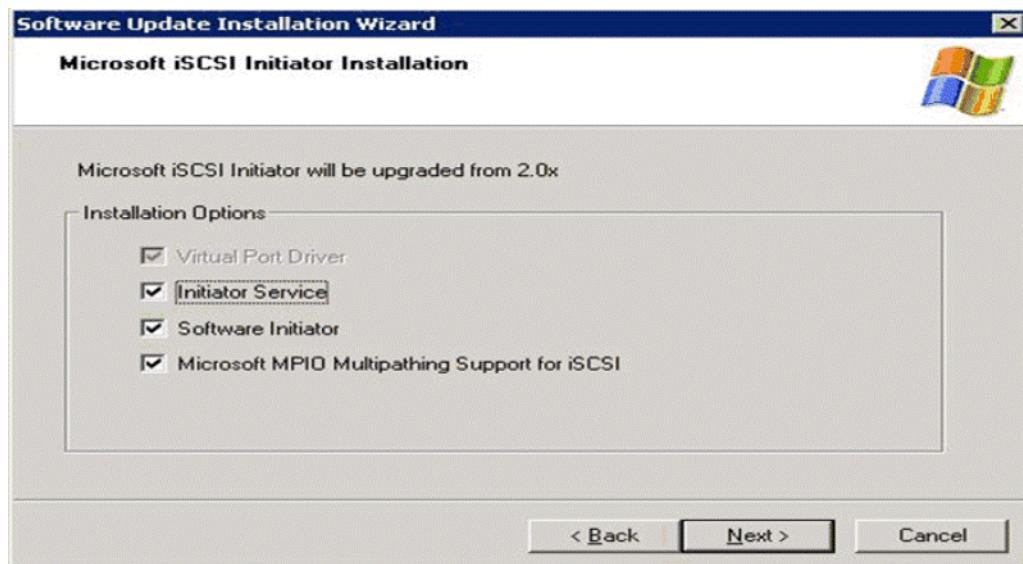
Figure 50 Installing the Windows Server kit



2. Install the Windows Server 2003 Initiator.

For Windows Server 2003, the Microsoft iSCSI initiator installation presents an option for installing MPIO using the Microsoft generic DSM (Microsoft MPIO Multipathing Support for iSCSI check box). For Windows Server 2008, MPIO is installed separately. See [Figure 51 \(page 60\)](#).

Figure 51 Installation Wizard



3. Setup the Microsoft iSCSI Initiator.
 - a. Click the **Microsoft iSCSI Initiator** icon to open the Control Panel applet. The **iSCSI Initiator Properties** window opens.
 - b. Select the **Discovery** tab. See [Figure 52 \(page 60\)](#) or [Figure 53 \(page 61\)](#).

Figure 52 iSCSI initiator properties: Discovery tab (Windows 2003)

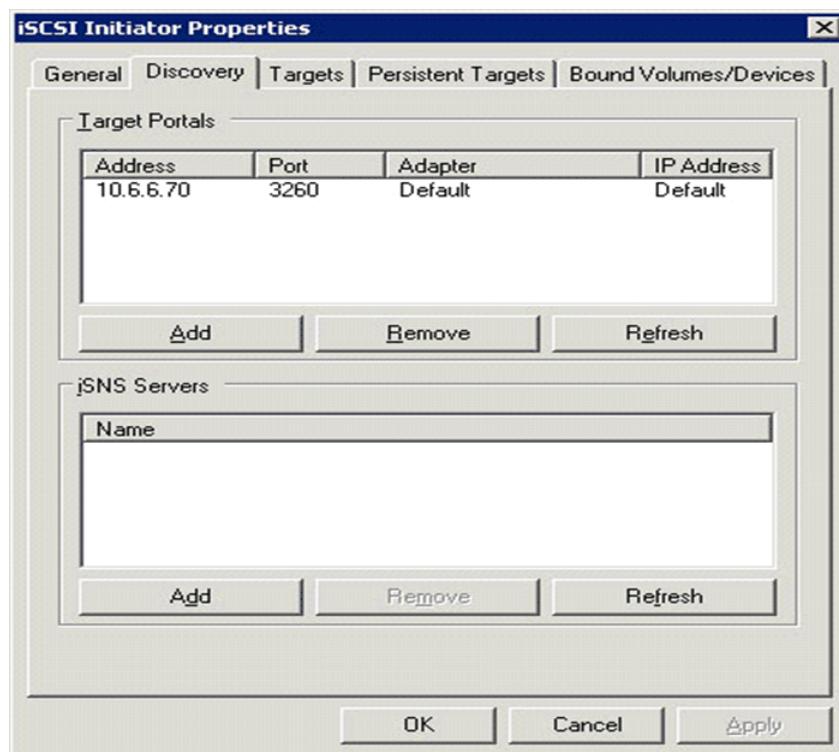
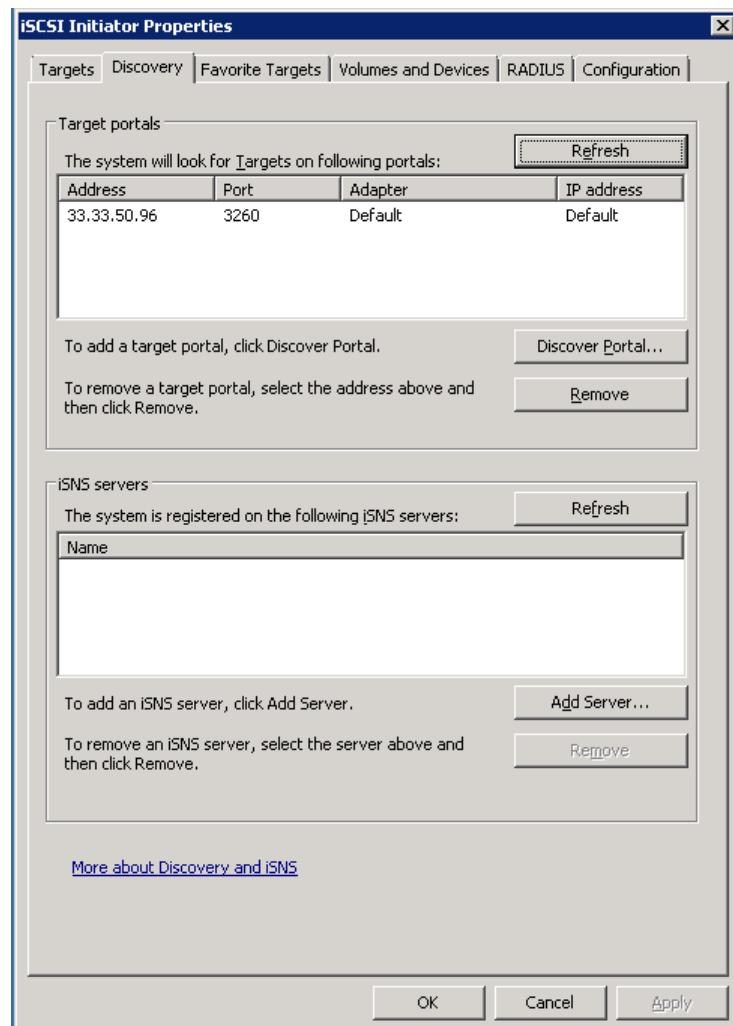


Figure 53 iSCSI initiator properties: Discovery tab (Windows 2012, 2008)

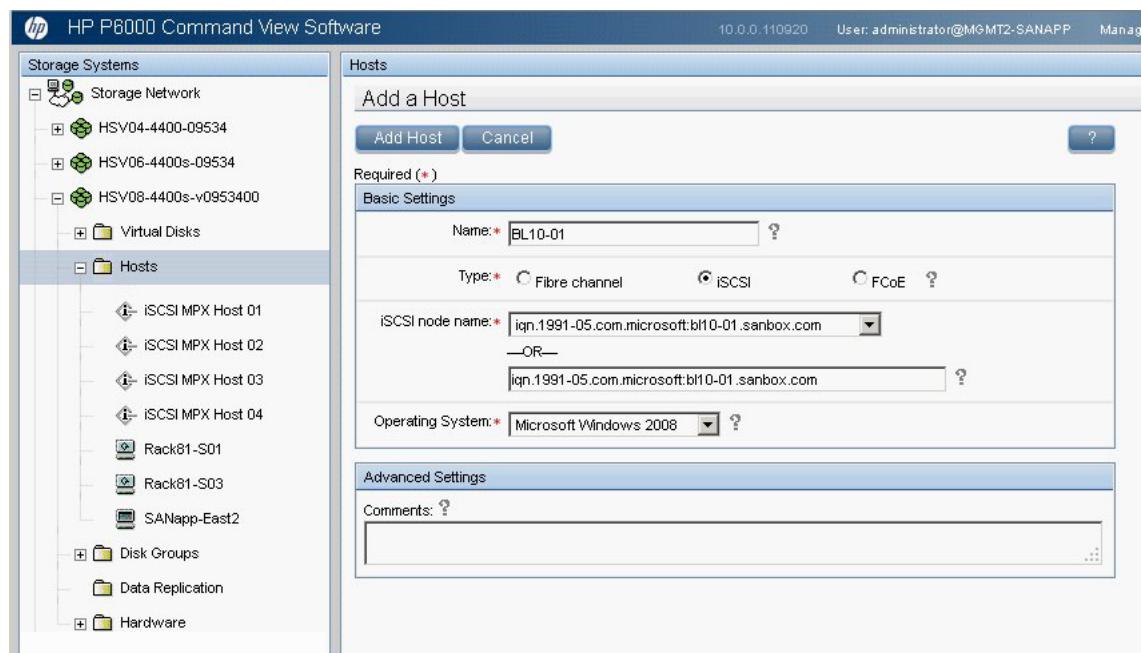


- c. In the **Target Portals** section, click **Add** (Windows 2003) or **Discover Portal** (Windows 2012, 2008).
A dialog box opens.
- d. Enter the iSCSI port IP address.
- e. Click **OK**.
The discovery is complete.

4. In HP P6000 Command View, set up the iSCSI host and virtual disks.

- a. Click the P6000 EVA **Storage Systems** icon to start the iSCSI storage presentation.

Figure 54 Adding a host



- b. Select the **Hosts** folder.
- c. Click **Add a Host** to create an iSCSI initiator host.

A dialog box opens.

- Enter a name for the initiator host in the **Name** box.
- Select **iSCSI** as the Type.
- Select the initiator IQN from the iSCSI node name list.
- Select an operating system from the **Operating System** list.

NOTE: For Windows 2012, select the default operating system "Windows" as the host mode in Command View, then go to the MPX200 CLI and change the host mode of this host to "Windows 2012".

d. Create a virtual disk and present it to the host you created in [Step 4.c](#). Note the circled number in the target IQN; it is referenced during initiator login. See [Figure 55 \(page 63\)](#) and [Figure 56 \(page 63\)](#).

Figure 55 Virtual disk properties

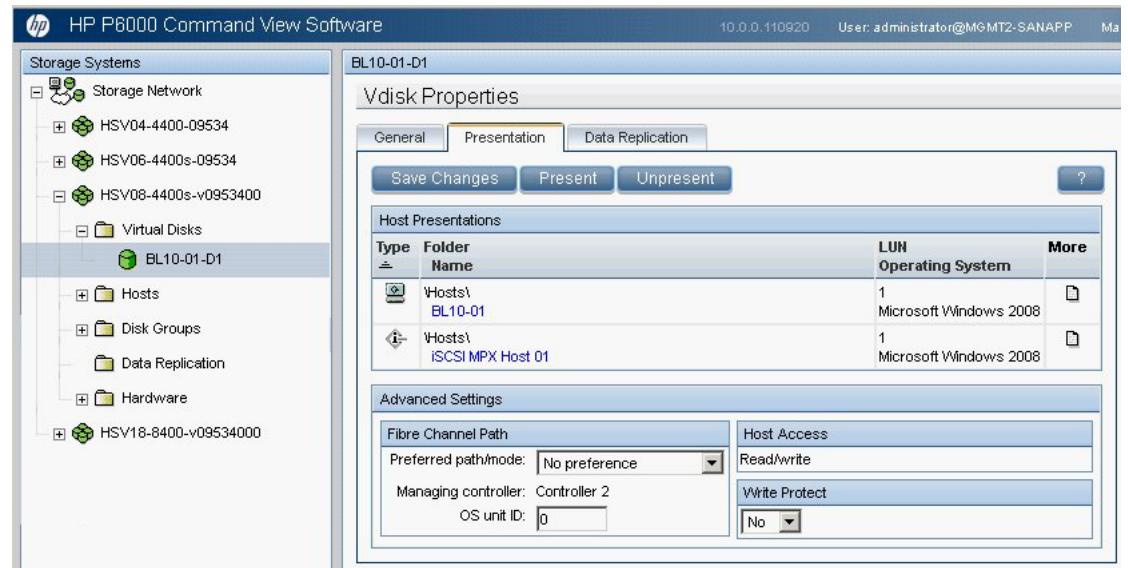
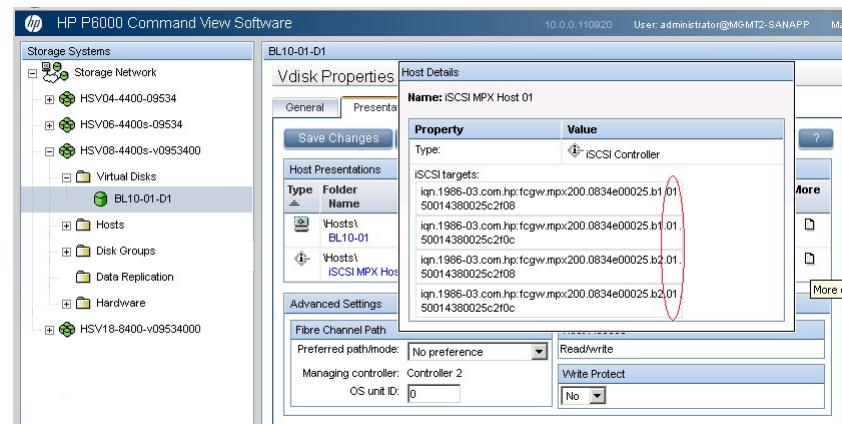


Figure 56 Host details



5. Set up the iSCSI disk on the iSCSI initiator.
 - a. Open the iSCSI initiator Control Panel applet.
 - b. Select the **Targets** tab and then click the **Refresh** button to see the available targets. See Figure 57 (page 64) or Figure 58 (page 65). The status should be Inactive.

Figure 57 Targets tab (Windows 2003)

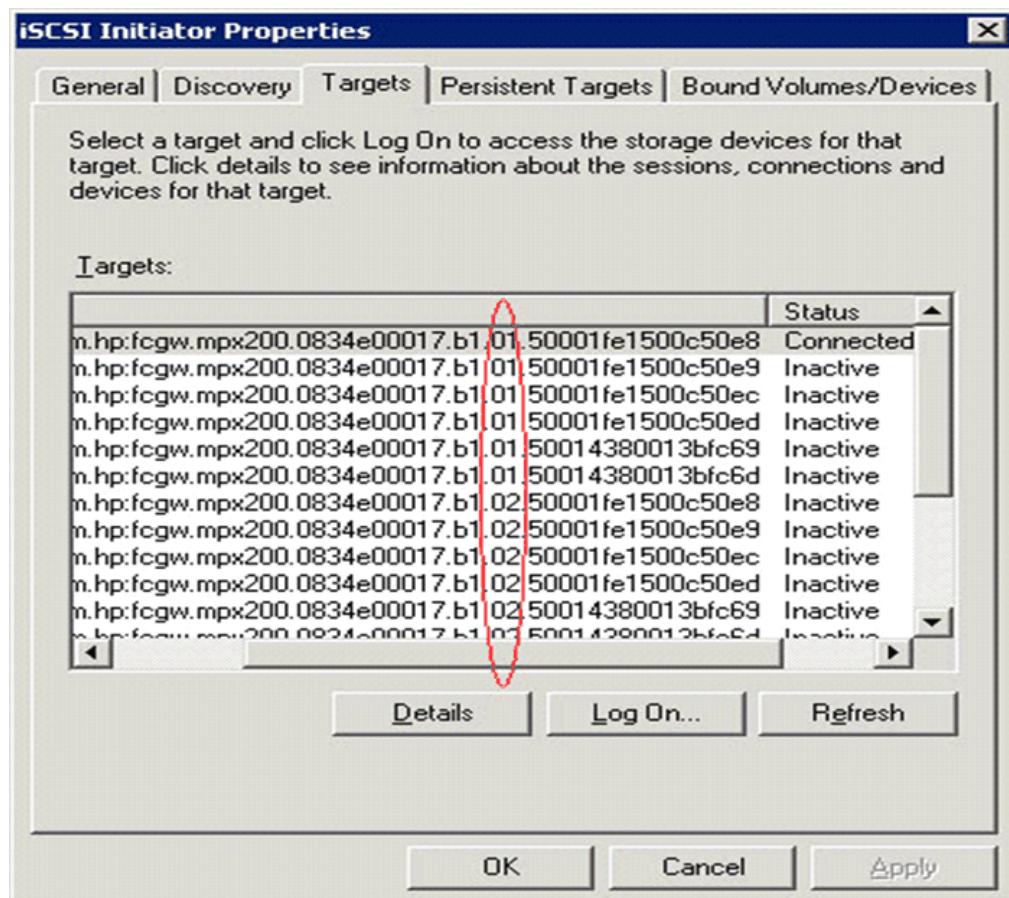
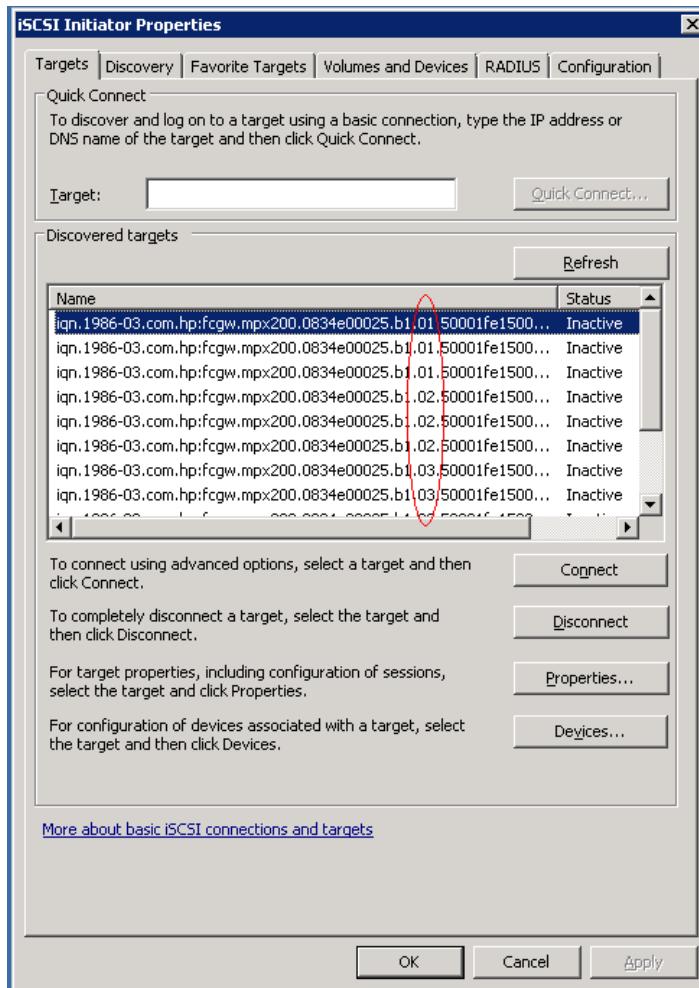


Figure 58 Targets tab (Windows 2012, 2008)



- c. Select the target IQN noted in **Step 4d**, and then click **Log On**.
A dialog box opens.
- d. Configure the target IQN.
 - Select the **Automatically** check box to restore this connection when the system boots.
 - Select the **Multipathing** check box to enable MPIO. The target status is Connected when logged in.

NOTE: HP recommends using the **Advanced** button to choose the Local Adapter, Source IP, and Target Portal. The Target Portal IP Address is the iSCSI port that this initiator connection is defined.

- e. Depending on the operating system, open **Server Manager** or **Computer Management**.
- f. Select **Disk Management**.
- g. Select **Action→Rescan Disks**. Verify that the newly assigned disk is listed; if not, you may need to reboot.
- h. Format and partition the disk to prepare it for use.

Multipathing

Microsoft MPIO includes support for redundant paths to send I/O from the initiator to the target. For Windows Server 2008, MPIO is a separate feature that must be installed separately. Microsoft iSCSI Software Initiator 2.x includes MPIO and must be selected for installation. Setting up redundant paths properly ensures high availability of the target disk. Ideally, the paths would use separate

NICs and a separate network infrastructure (cables, switches, and MPX200 blades). HP recommends using separate target ports.

Microsoft MPIO allows the initiator to log in to multiple sessions to the same target and aggregate the duplicate devices into a single device exposed to Windows. Each session to the target can be established using different NICs, network infrastructure, and target ports. If one session fails, another session can continue processing I/O without interrupting the application. The iSCSI target must support multiple sessions to the same target. The Microsoft iSCSI MPIO DSM supports a set of load-balance policies that determine how I/O is allocated among sessions. With Microsoft MPIO, the load-balance policies apply to each LUN individually.

The Microsoft iSCSI DSM 2.x assumes that all targets are active/active and can handle I/O on any path at any time. There is no mechanism in the iSCSI protocol to determine whether a target is active/active or active/passive; therefore, the MPX200 supports only multipath configurations with the P6000 EVA with active/active support. For more information, see the following:

<http://www.microsoft.com/WindowsServer2003/technologies/storage/mpio/default.mspx>

<http://www.microsoft.com/WindowsServer2003/technologies/storage/mpio/faq.mspx>

<http://download.microsoft.com/download/3/0/4/304083f1-11e7-44d9-92b9-2f3cdbf01048/mpio.doc>

Table 12 (page 66) details the differences between Windows Server 2008 and Windows Server 2003.

Table 12 Differences between Windows Server 2012/2008 and Windows Server 2003

	Windows Server 2012, 2008	Windows Server 2003
iSCSI initiator	Included with operating system	Must be installed separately
MPIO	Must be installed separately	Included with iSCSI initiator

Table 13 (page 66) lists the supported MPIO options for the MPX200.

Table 13 MPIO options for the MPX200

Multipath support	Windows Server 2012, 2008	Windows Server 2003
HP MPIO Full Featured DSM for P6000 EVA (preferred)	Supported	Supported
Microsoft generic DSM	Supported	Supported

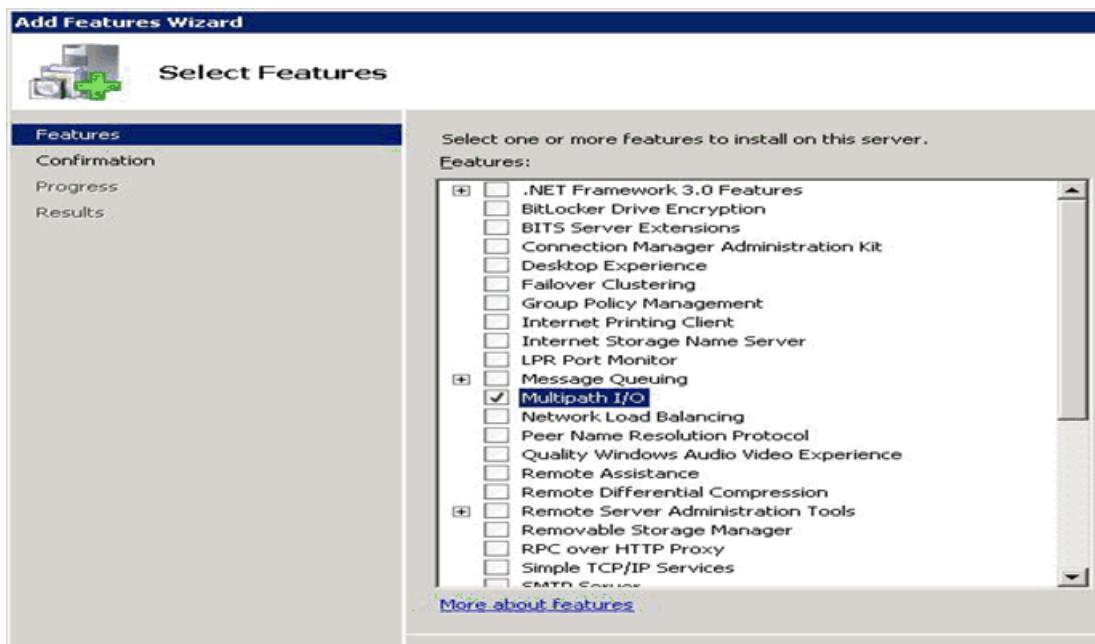
Installing the MPIO feature for Windows Server 2012, 2008

NOTE: Microsoft Windows 2012, 2008 includes an MPIO feature that must be installed separately. It also includes the iSCSI initiator, which does not require download or installation.

To install the MPIO feature for Windows Server 2012, 2008:

1. Select the **Multipath I/O** check box on the **Select Features** page (Figure 59 (page 67)).

Figure 59 Select Features page



2. Click **Next**, and then click **Install**.
3. After the server reboots, add support for iSCSI devices using the MPIO applet (Figure 60 (page 67) and Figure 61 (page 68)).

NOTE: You must present a virtual disk to the initiator to enable the **Add support for iSCSI devices** check box (see Figure 60 (page 67)).

Figure 60 MPIO Properties page before reboot

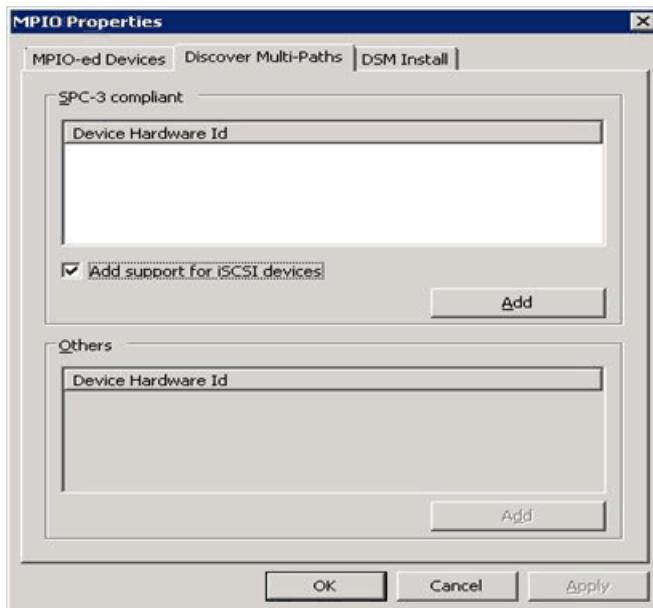
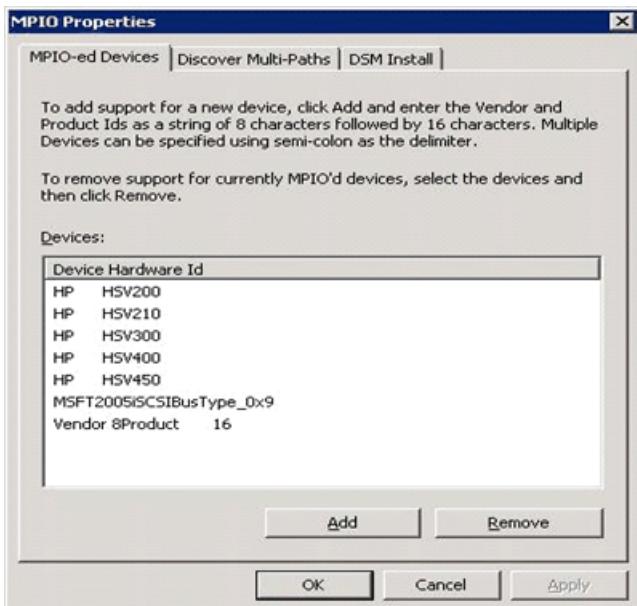


Figure 61 MPIO Properties page after reboot

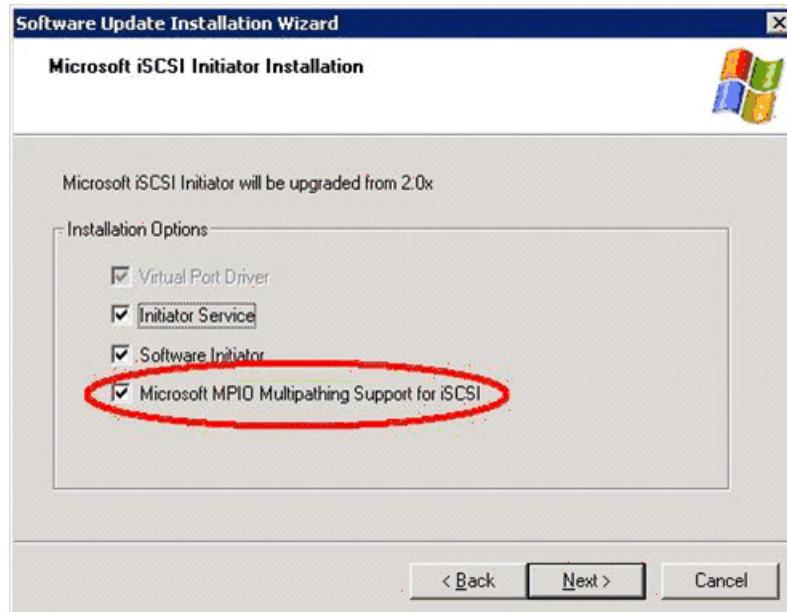


4. Reboot the system to MPIO the devices.

Installing the MPIO feature for Windows Server 2003

For Windows Server 2003, if you are installing the initiator for the first time, select all of the installation option check boxes, and then click **Next** (Figure 62 (page 68)).

Figure 62 Software update installation wizard



To add or remove Microsoft iSCSI initiator components after the initial installation, run the setup package executable and select the **Microsoft MPIO Multipathing Support for iSCSI** check box. The application automatically selects the check boxes for components that are already installed. For example, if you want to add the Microsoft MPIO component, leave the other check boxes blank; select only the Microsoft MPIO check box.

NOTE: After the installation is complete, you must reboot the system.



IMPORTANT: Windows XP Professional does not support Microsoft MPIO.

Microsoft Windows Server 2003 Scalable Networking Pack

The Microsoft Windows Server 2003 SNP includes the TCP Chimney feature, which allows TCP network processing to be off-loaded to hardware. SNP also includes the Receive Side Scaling feature, which allows receive packet processing to scale across multiple CPUs.

The HP NC3xxx Multifunction Gigabit server adapters use SNP to support TCP off-load functionality.

For support details, see the latest HP adapter information at <http://h18004.www1.hp.com/products/servers/networking/index.html>.

To download the SNP package and for more details, see <http://support.microsoft.com/kb/912222>.

NOTE: Windows Server 2003 SP2 includes SNP functionality.

Setting up SNP for the HP NC3xxx Multifunction Gigabit server adapter

SNP works in conjunction with the HP NC3xxx Multifunction Gigabit server adapters for Windows 2003 only.

To set up SNP on a Windows 2003 server:

1. Following the manufacturer's installation instructions, install the hardware and software for the NC3xxx Multifunction Gigabit server adapter.
2. Download the SNP package from the Microsoft website: <http://support.microsoft.com/kb/912222>.
 - To start the installation immediately, click **Run**.
 - To copy the download to your computer for installation at a later time, click **Save**.A reboot is required after successful installation.
3. After the reboot, verify the TCP off-load settings by opening a command prompt window and entering the following command:

```
C:\>netsh interface ip show offload
```

The following is displayed:

```
Offload Options for interface "33-IP Storage Subnet" with index:  
10003:  
TCP Transmit Checksum  
IP Transmit Checksum  
TCP Receive Checksum  
IP Receive Checksum  
TCP Large Send TCP Chimney Offload.
```

4. To enable or disable the TOE Chimney feature, enter one of the following commands:

```
C:\>netsh int ip set chimney enabled
```

```
C:\>netsh int ip set chimney disabled
```

For more information, see <http://support.microsoft.com/kb/912222>.

iSCSI initiator setup for Apple Mac OS X (single-path)

The EVA4400 and P6000 EVA connectivity option supports ATTO Technology's Xtend SAN iSCSI Initiator for Mac OS X. For details, see <http://www.attotech.com>.

Setting up the iSCSI initiator for Apple Mac OS X

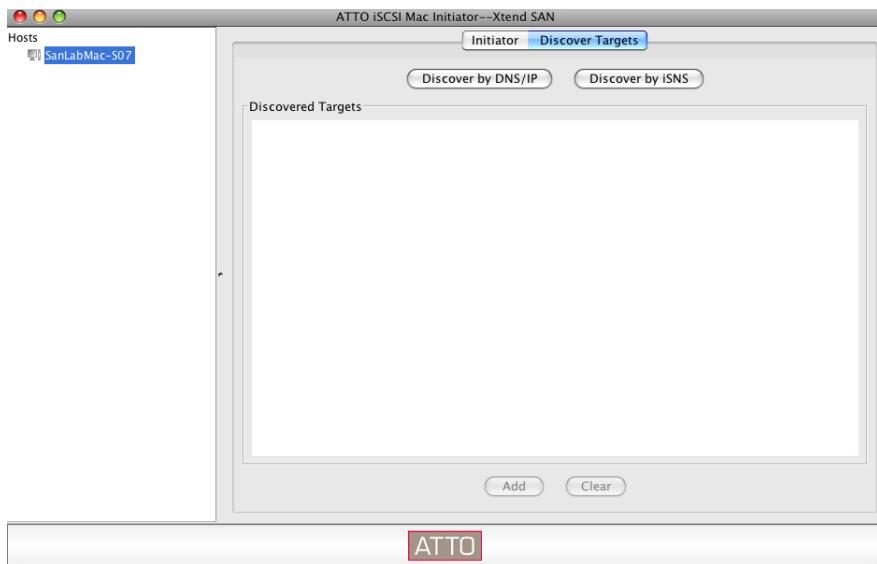
1. Install the Xtend SAN iSCSI Initiator 3.10.
2. Run the Xtend SAN iSCSI application to discover and configure the P6000 EVA iSCSI targets.

The Xtend SAN iSCSI Initiator can discover targets either by static address or iSNS.

For static address discovery:

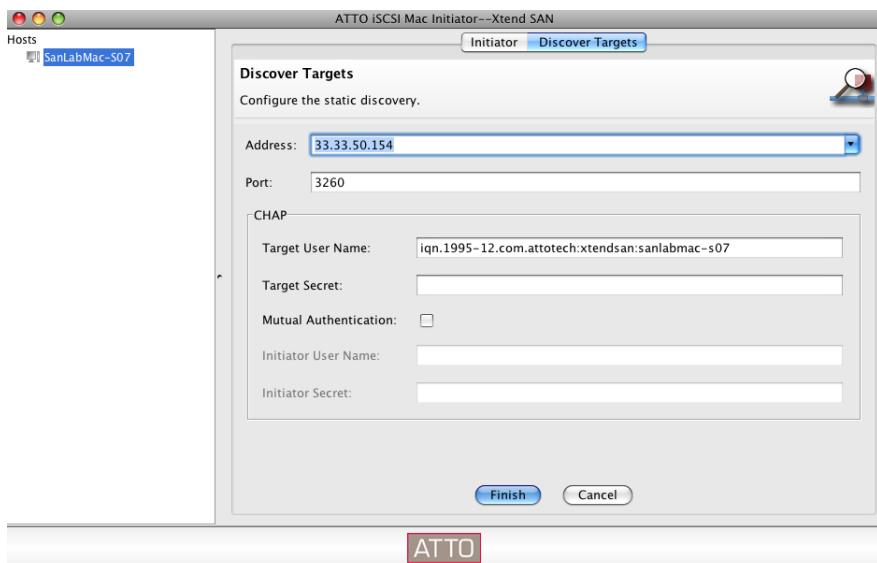
- a. Click **Discover Targets**, and then click **Discover by DNS/IP** (Figure 63 (page 70)).

Figure 63 Discover targets



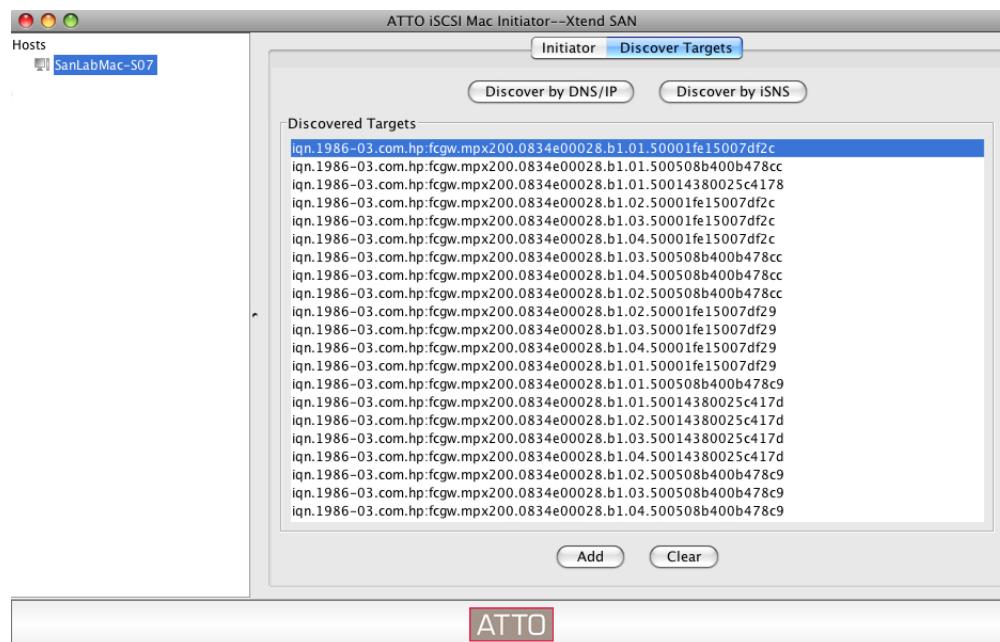
- b. Enter the static IP address of the mpx iSCSI port in the **Address** box, and then click **Finish** (Figure 64 (page 70)).

Figure 64 Add static IP address



c. Select a target from the **Discovered Targets** list and then click **Add** (Figure 65 (page 71)).

Figure 65 Discovered Targets list

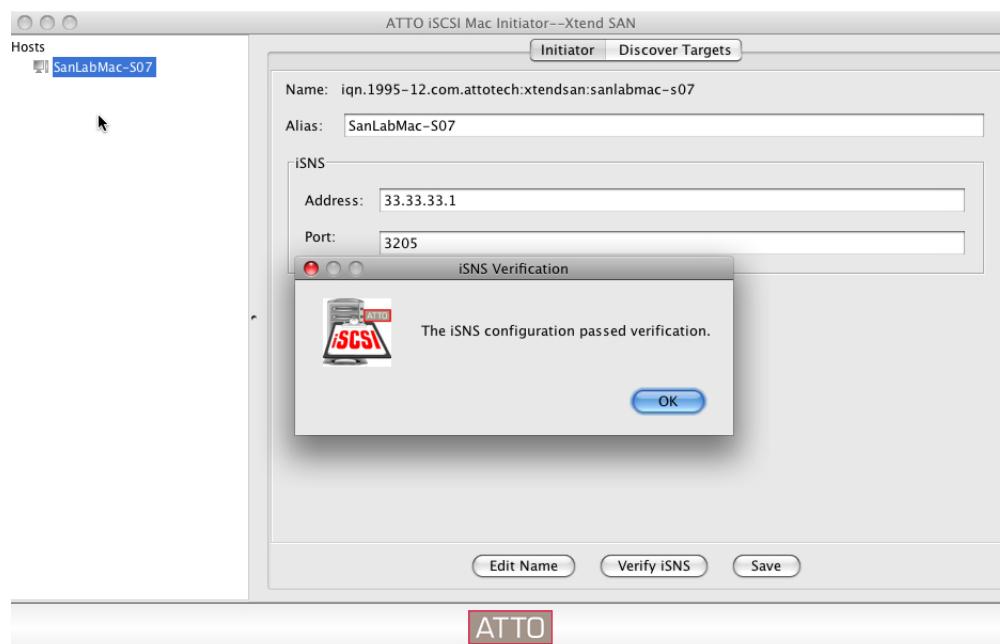


NOTE: The mpx iSCSI port may present several iSCSI targets to the Xtend SAN iSCSI Initiator. Select only one target from the list.

d. **For iSNS discovery**

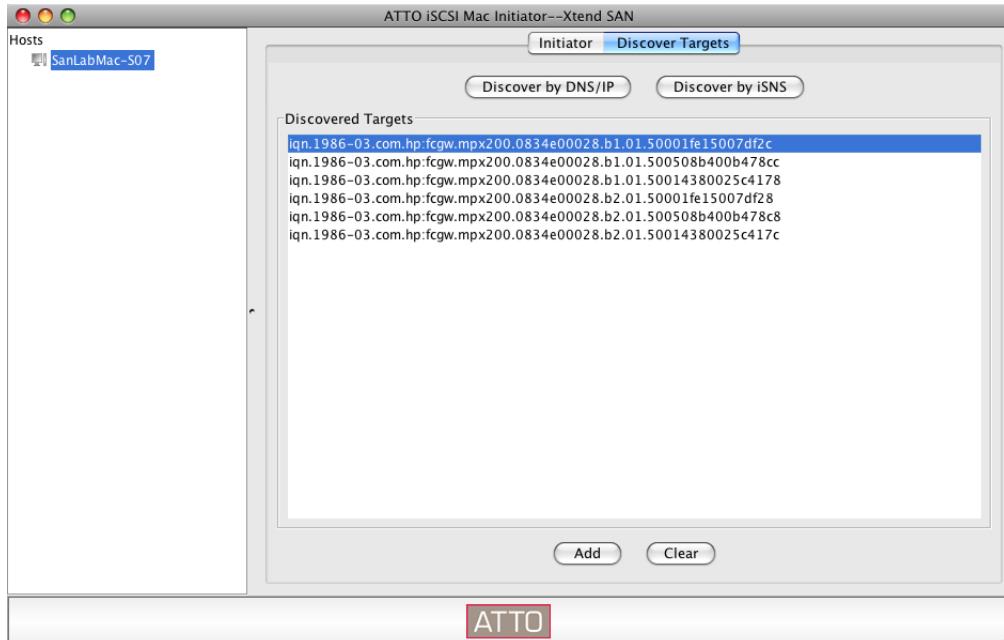
Select **Initiator** and then enter the iSNS name or IP address in the box (Figure 66 (page 71)).

Figure 66 iSNS discovery and verification



- e. Test the connection from the initiator to the iSNS server by clicking **Verify iSNS**. If successful, click **Save**.
If necessary, from the iSNS server, make the appropriate edits to add the Xtend SAN iSCSI Initiator to any iSNS discovery domains that include MPX iSCSI targets.
- f. Click **Discover Targets**, and then click **Discover by iSNS**.
A list of MPX targets appears under Discovered Targets ([Figure 67 \(page 72\)](#)).

Figure 67 Discovered Targets

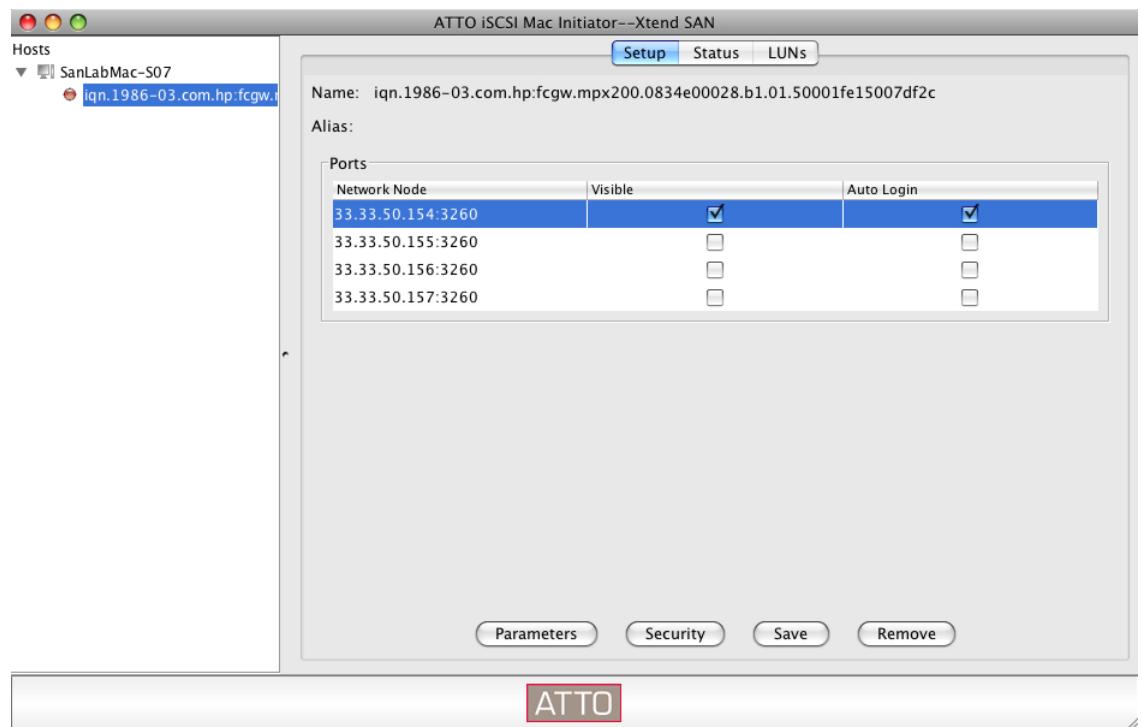


NOTE: The MPX iSCSI port may present several iSCSI targets to the Xtend SAN iSCSI Initiator. Select only one target from the list.

- g. Select the newly added target under Host name in the left pane.
- h. Select the **Visible** check box to allow the initiator to display the target status ([Figure 68 \(page 73\)](#)).
- i. Select the **Auto Login** check box to configure the initiator to automatically log in to the iSCSI target at system startup.

j. Click **Save**.

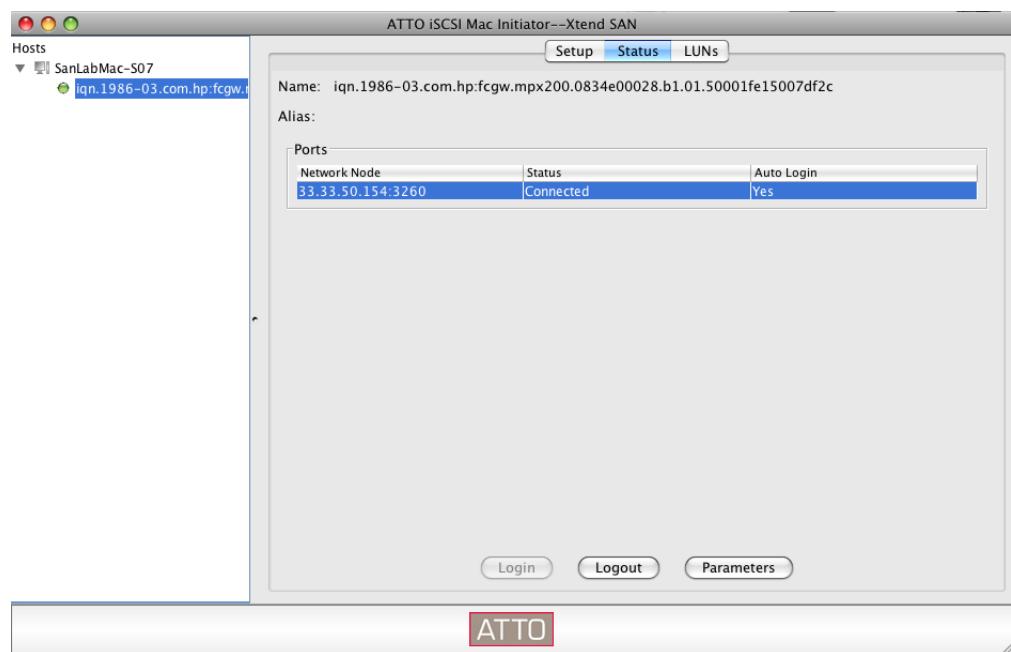
Figure 68 Selecting the newly added target



k. Click **Status**, select the network node, and then click **Login** to connect to the MPX target (Figure 69 (page 73)).

The target status is Connected and the target status light turns green.

Figure 69 Select status

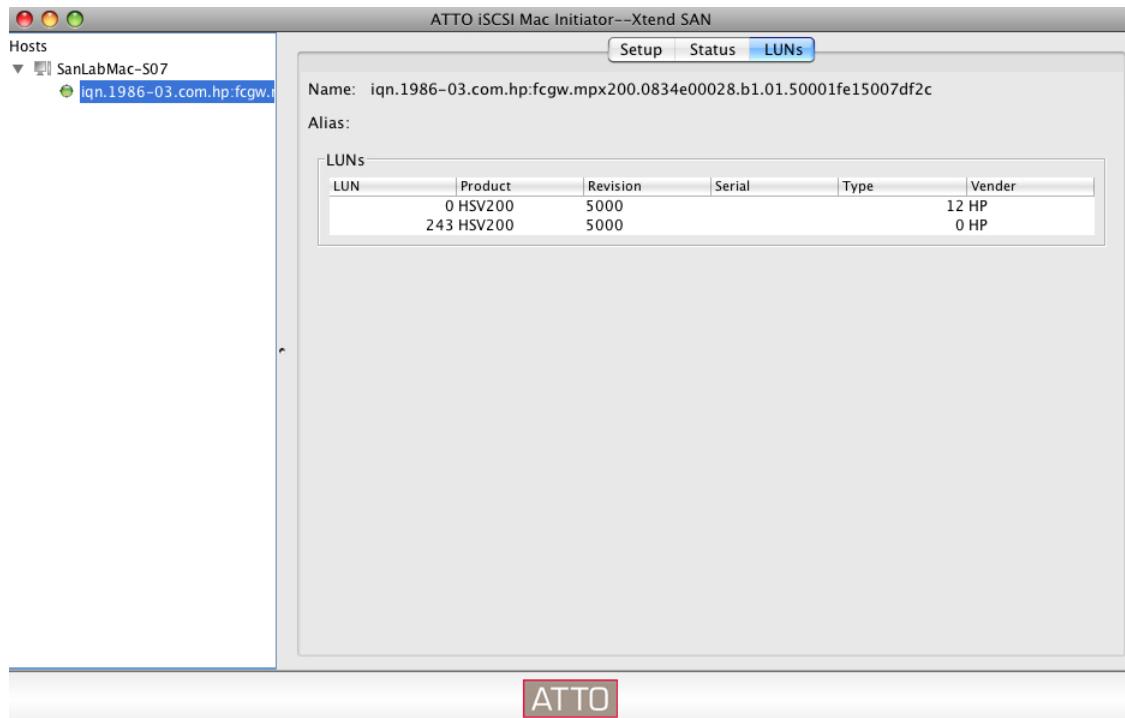


Setting up storage for Apple Mac OS X

1. In HP P6000 Command View, present the LUNs.
2. Verify that the P6000 EVA LUNs are presented to the Xtend SAN iSCSI Initiator:
 - a. Open the Xtend SAN iSCSI application.
 - b. Select the MPX200 target entry under the host name.
 - c. Click **LUNs**.

A list of presented P6000 EVA LUNs is displayed ([Figure 70 \(page 74\)](#)).

Figure 70 Presented P6000 EVA LUNs



NOTE: If no LUNs are displayed, log out and then log in again to the target, or reboot the system.

3. Set up the iSCSI drive on the Xtend SAN iSCSI Initiator:
 - a. Open Disk Utilities from the Apple Mac OS X Finder Applications list.
 - b. Format and partition the P6000 EVA LUN, as needed.

iSCSI initiator setup for Linux

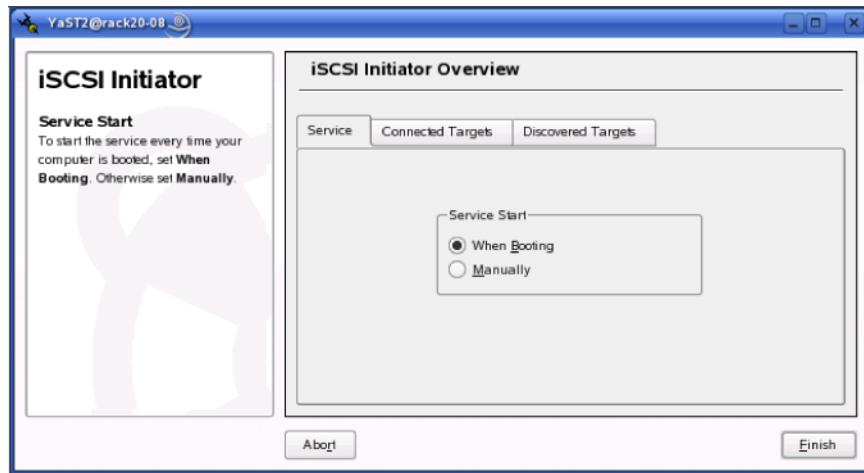
Installing and configuring the SUSE Linux Enterprise 10 iSCSI driver

Configure the initiator using the built-in GUI-based tool or the `open-iscsi` administration utility using the `iscsiadm` command. For detailed command information, see the `iscsiadm` (8) man pages.

1. Modify the initiator name:

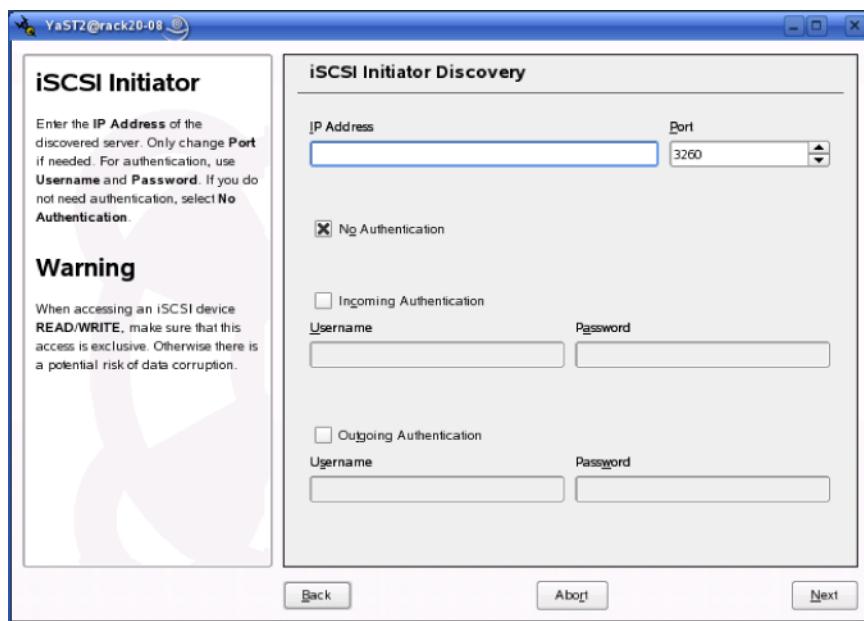
```
# vi /etc/<initiatorname>.iscsi
```
2. To configure the initiator and targets, start the iSCSI initiator applet (located in the YaST Control Center under Network Services), and then set the initiator to start at boot time ([Figure 71 \(page 75\)](#)).

Figure 71 Configure the iSCSI initiator and targets



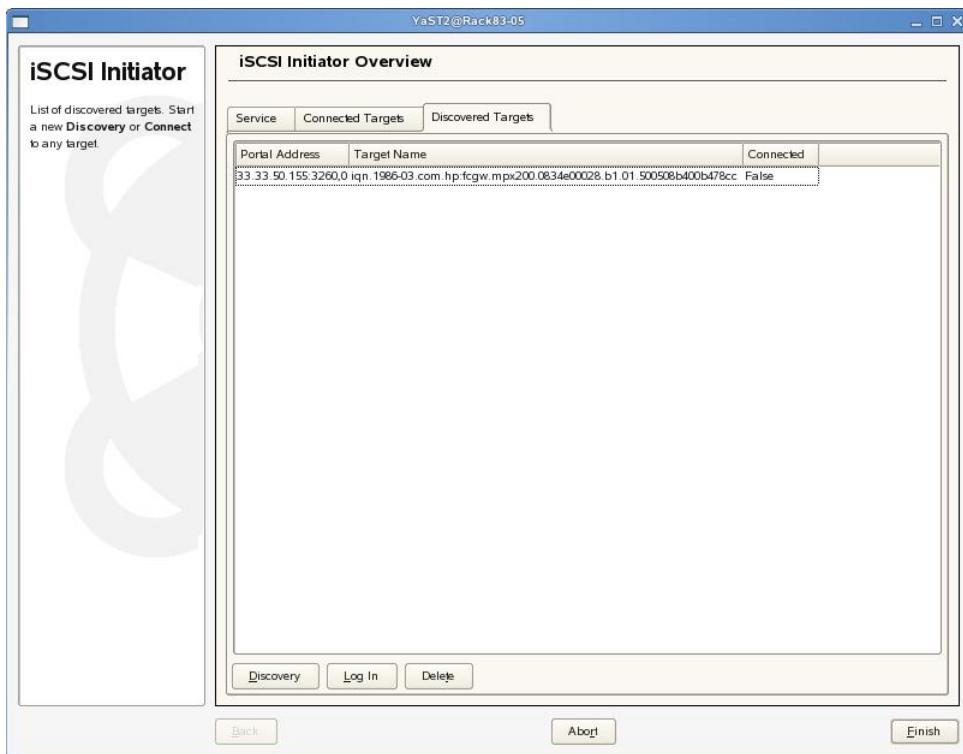
3. Select the **Discovered Targets** tab and enter the iSCSI target IP address (Figure 72 (page 75)).

Figure 72 Discovered Targets tab



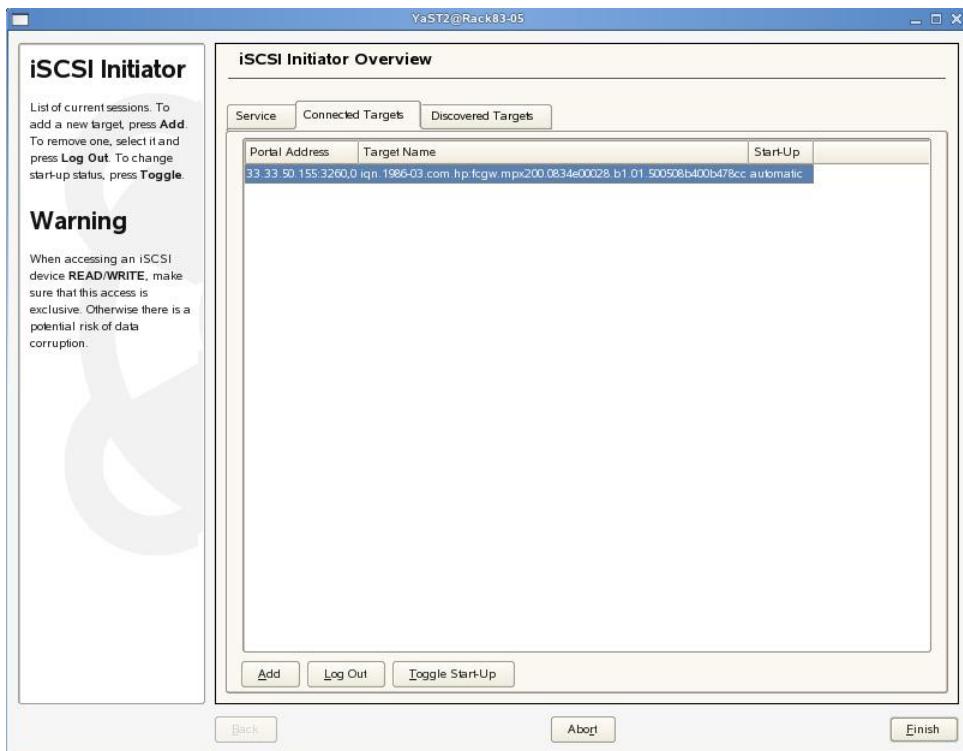
4. Log in to the target (Figure 73 (page 76)).

Figure 73 Log in to the target



5. Select the **Connected Targets** tab, and then click the **Toggle Start-Up** button for each target listed so the targets start automatically (Figure 74 (page 76)).

Figure 74 Connected Targets tab



Installing and configuring the iSCSI driver for Red Hat 5

NOTE: The iSCSI driver package is included but is not installed by default. Install the package `iscsi-initiator-utils` during or after operating system installation.

To install and configure the iSCSI driver for Red Hat 5:

1. Use the `iscsiadm` command to control discovery and connectivity:

```
# iscsiadm -m discovery -t st -p 10.6.0.33:3260
```

2. Edit the initiator name:

```
# vi /etc/iscsi/initialname.iscsi
```

3. Start the iSCSI service:

```
# service iscsi start
```

4. Verify that the iSCSI service starts automatically:

```
#chkconfig iscsi on
```

NOTE: For details, see the man pages for the `iscsiadm` open-iscsi administration utility.

Installing and configuring the iSCSI driver for Red Hat 4 and SUSE 9

NOTE: The iSCSI driver is included with the Red Hat 4 and SUSE 9 distributions and is installed by default. Configuration is the same for Red Hat 3 and 4 and SUSE 8 and 9.

To install and configure the iSCSI driver for Red Hat 4 and SUSE 9:

1. Update the `/etc/iscsi.conf` file to include the IP address of the iSCSI target.

The configuration file might include entries like this:

```
DiscoveryAddress=33.33.33.101
```

For a detailed description of the configuration file format, enter the following command:

```
man iscsi.conf
```

2. Manually start iSCSI services to test your configuration:

```
/etc/init.d/iscsi start
```

3. Modify the `/etc/<initialname>.iscsi` file to assign a meaningful name to the initiator. For example:

```
InitiatorName=iqn.1987-05.com.cisco:servername.yourcompany.com
```

NOTE: In most cases, you only modify the text following the colon.

If there is a problem starting the `iscsi` daemon, it is usually due to an incorrect IP address or an incorrectly formatted initiator name.

Installing the iSCSI initiator for Red Hat 3 and SUSE 8

If you are upgrading from a previous version of an iSCSI driver, HP recommends that you remove the `/etc/<initialname>.iscsi` file before installing the new driver. For the latest version of the Linux driver for P6000 EVA iSCSI connectivity, see:

<http://sourceforge.net/projects/linux-iscsi>

NOTE: The Linux driver supports both Red Hat 3 and SUSE 8. For information on how to configure the Linux iSCSI initiator, see the `Readme` file in the tar ball.

Assigning device names

Linux assigns SCSI device nodes dynamically when it detects a SCSI logical unit; therefore, the mapping from device nodes (such as `/dev/sda` and `/dev/sdb`) to iSCSI targets and logical units may vary.

Variations in process scheduling and network delay can result in iSCSI targets being mapped to different SCSI device nodes each time the driver is started. Therefore, configuring applications or operating system utilities to use the standard SCSI device nodes to access iSCSI devices can result in SCSI commands being sent to the wrong target or logical unit.

To ensure consistent naming, the iSCSI driver scans the system to determine the mapping from SCSI device nodes to iSCSI targets. The iSCSI driver creates a tree of directories and symbolic links under `/dev/iscsi` to facilitate access to a logical unit of an iSCSI target.

The directory tree under `/dev/iscsi` contains subdirectories for each iSCSI bus number, each target ID number on the bus, and each LUN for each target. For example, the disk device for bus 0, target ID 0, and LUN 0 would be `/dev/iscsi/bus0/target0/LUN0/disk`.

Each logical unit directory contains a symbolic link for each SCSI device node that can connect to that logical unit. The symbolic links are named using the Linux `devfs` naming convention.

- The symbolic link `disk` maps to the whole-disk SCSI device node (for example, `/dev/sda` or `/dev/sdb`).
- The symbolic links, `part1` through `part15`, map to each partition of the SCSI disk. For example, a symbolic link can map to partitions `/dev/sda1` and `/dev/sda15`, or to as many partitions as necessary.

NOTE: The symbolic links exist regardless of the number of disk partitions. Accessing a partition name results in an error if the partition does not exist on the disk.

- The symbolic link `mt` maps to the auto-rewind SCSI tape device node for the LUN (for example, `/dev/st0`). Additional links for `mt1`, `mtm`, and `mta` map to the other auto-rewind devices (for example, `/dev/st01`, `/dev/st0m`, `/dev/st0a`), regardless of whether those device nodes exist or can be opened.
- The symbolic link `mtn` maps to the no-rewind SCSI tape device node, if any. (For example, this LUN maps to `/dev/nst0`.) Additional links (`formtl1n`, `mtmn`, and `mtan`) map to the other no-rewind devices (for example, `/dev/nst01`, `/dev/nst0m`, `/dev/nst0a`), regardless of whether those device nodes exist or can be opened.
- The symbolic link `cd` maps to the SCSI CD-ROM device node, if any, for the LUN (for example, `/dev/scd0`).
- The symbolic link `generic` maps to the SCSI generic device node, if any, for the LUN (for example, `/dev/sg0`).

The `symlink` creation process must open all SCSI device nodes in `/dev` to determine which nodes map to iSCSI devices. Therefore, several `modprobe` messages may be logged to `syslog` indicating that `modprobe` could not find a driver for a particular combination of major and minor numbers. You can ignore these messages, which occur when Linux is unable to find a driver to associate with a SCSI device node that the iSCSI daemon is opening as part of the `symlink` creation process. To prevent these messages from occurring, remove the SCSI device nodes that do not contain an associated high-level SCSI driver.

Target bindings

The iSCSI driver automatically maintains a bindings file, `/var/iscsi/bindings`. This file contains persistent bindings to ensure that the same iSCSI bus and target ID number are used for every iSCSI session with a particular iSCSI `TargetName`, even if the driver is restarted repeatedly.

The bindings file ensures that the SCSI number in the `symlinks` device (described in “[Assigning device names](#)” (page 78)) always maps to the same iSCSI target.

NOTE: Linux dynamically allocates SCSI device nodes as SCSI devices are found; therefore, the driver cannot ensure that a SCSI device node (for example, `/dev/sda`) always maps to the same iSCSI target name. The `symlinks` described in “[Assigning device names](#)” (page 78) provide application and `fstab` file persistent device mapping; use these `symlinks` instead of direct references to SCSI device nodes.

If the bindings file grows too large, you can edit the file and remove the lines for targets that no longer exist. This should not be necessary because the driver can maintain up to 65,535 bindings.

Mounting file systems

The Linux boot process typically mounts the file systems listed in `/etc/fstab` before the network is configured; therefore, adding mount entries in iSCSI devices to `/etc/fstab` does not work.

The `iscsi-mountall` script manages the checking and mounting of devices listed in `/etc/fstab.iscsi`, which has the same format as `/etc/fstab`. This script is invoked automatically by the iSCSI startup script.

NOTE: If iSCSI sessions are unable to log in immediately due to network or authentication problems, the `iscsi-mountall` script may time out and fail to mount the file systems.

Mapping inconsistencies can occur between SCSI device nodes and iSCSI targets (for example, the wrong device is mounted because of device name changes resulting from iSCSI target configuration changes or network delays). Instead of directly mounting SCSI devices, HP recommends that you do one of the following:

- Mount the `/dev/iscsi` symlink tree.
- Mount the file system UUIDs or labels (see the man pages for `mke2fs`, `mount`, and `fstab`).
- Use the Linux Logical Volume Manager.

Unmounting file systems

You must unmount all file systems on iSCSI devices before the iSCSI driver stops. If the iSCSI driver stops while iSCSI devices are mounted, buffered writes may not be committed to disk, and file system corruption may occur.

Linux does not unmount file systems that are being used by a process; therefore, any process using those devices must be stopped (see the man page for `fuser(1)`) before iSCSI devices can be unmounted.

To prevent file system corruption, the iSCSI shutdown script automatically stops all processes using devices in `/etc/fstab.iscsi`. The script sends a `SIGTERM` signal to stop the processes, followed by a `SIGKILL` signal to stop any remaining processes. It then unmounts all iSCSI file systems and stops the iSCSI daemon, terminating all connections to iSCSI devices.

⚠ CAUTION: File systems not listed in `/etc/fstab.iscsi` cannot be unmounted automatically.

Presenting P6000 EVA storage for Linux

To present P6000 EVA storage for Linux:

1. Set up the LUNs by using HP P6000 Command View, as described in [Step 4](#).

2. Set up the iSCSI drive on the iSCSI initiator.
 - a. Restart the iSCSI services:


```
/etc/rc.d/initd/iscsi restart
```
 - b. Verify that the iSCSI LUNs are presented to the operating system:


```
fdisk -l
```

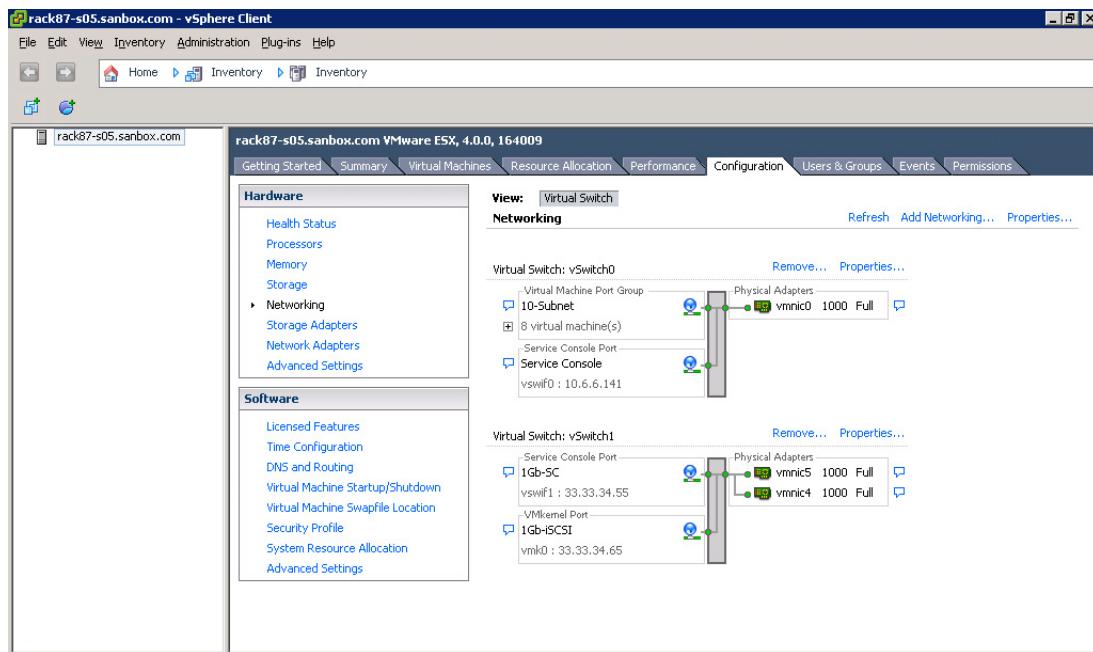
iSCSI Initiator setup for VMware

The software iSCSI Initiator is built into the ESX server VMkernel and uses standard 10GigE/GigE NICs to connect to the MPX200.

To set up software-based iSCSI storage connectivity:

1. Install the appropriate license from VMware to enable iSCSI software driver using the VMware instructions.
2. Configure the VMKernel TCP/IP networking stack for iSCSI support. Configure the VMkernel service console with dedicated virtual switch with a dedicated NIC for iSCSI data traffic. Follow the instructions from VMware. ["Configuration tab" \(page 80\)](#) shows an example of a configuration.

Figure 75 Configuration tab

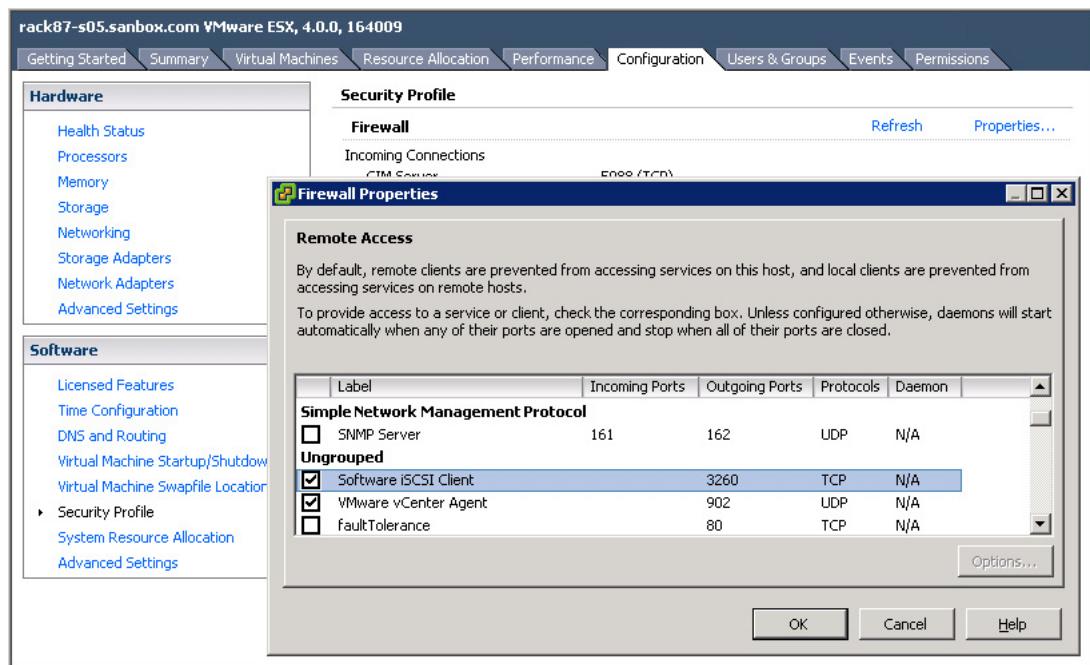


3. Open a firewall port by enabling the iSCSI software client service:
 - a. Using the VMware VI client, select the server.
 - b. Click the **Configuration** tab, and then click **Security Profile**.
 - c. Click the **Properties** link.

The **Firewall Properties** dialog box is displayed. See ["Firewall Properties dialog box" \(page 81\)](#).

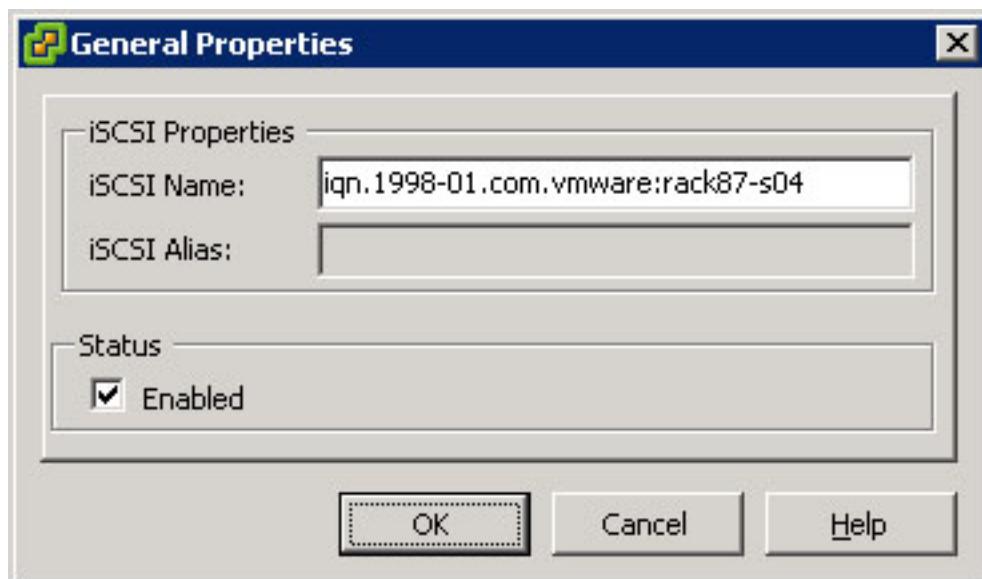
 - d. Select the check box for **Software iSCSI** to enable iSCSI traffic.
 - e. Click **OK**.

Figure 76 Firewall Properties dialog box



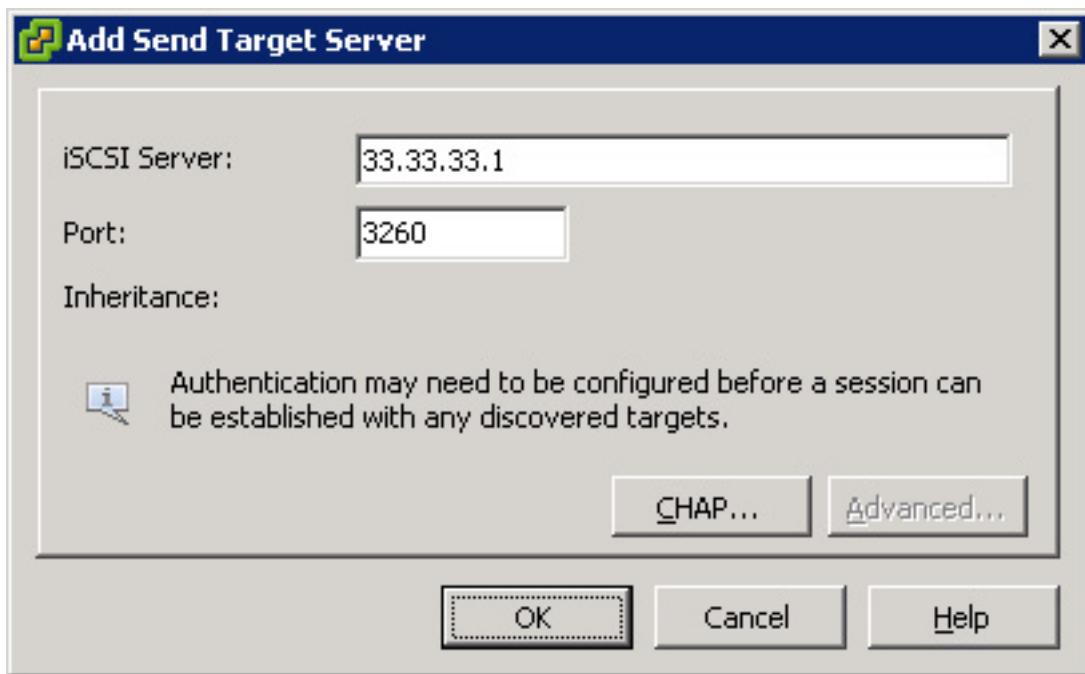
4. Enable the iSCSI software initiators:
 - a. In the VMware VI client, select the server from the inventory panel.
 - b. Click the **Configuration** tab, and then click **Storage Adapters** under Hardware.
 - c. Under **iSCSI Software Adapter**, choose the available software initiator.
 - d. Click the **Properties** link of the software adapter.
 - The **iSCSI Initiator Properties** dialog box is displayed.
 - e. Click **Configure**.
 - The **General Properties** dialog box is displayed. See “[General Properties dialog box](#)” (page 81).
 - f. Select the **Enabled** check box.
 - g. Click **OK**.

Figure 77 General Properties dialog box



5. Set up Discovery Addressing for the software initiator:
 - a. Repeat Step 4 to open the **iSCSI initiator Properties** dialog box.
 - b. Click the **Dynamic Discovery** tab.
 - c. Click **Add** to add a new iSCSI target.
The **Add Send Target Server** dialog box is displayed. See ["Add Send Target Server dialog box" \(page 82\)](#).
 - d. Enter the iSCSI IP address of the MPX200.
 - e. Click **OK**.

Figure 78 Add Send Target Server dialog box



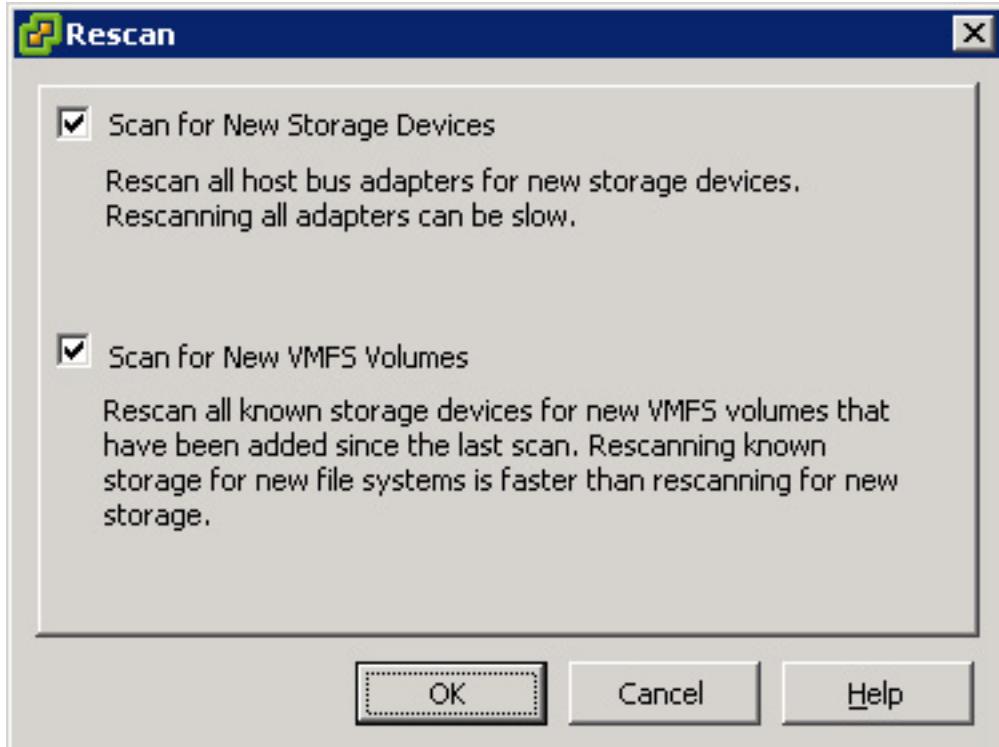
6. To verify that the LUNs are presented to the VMware host, rescan for new iSCSI LUNs:
 - a. In VMware's VI client, select a server and click the **Configuration** tab.
 - b. Choose **Storage Adapters** in the hardware panel and click **Rescan** above the Storage Adapters panel.

The **Rescan** dialog box is displayed. See “Rescan dialog box” (page 83).

- c. Select the **Scan for New Storage Devices** and the **Scan for New VMFS Volumes** check boxes.
- d. Click **OK**.

The LUNs are now available for ESX server.

Figure 79 Rescan dialog box



NOTE: When presenting iSCSI storage to Virtual Machines you must do the following:

- Create Virtual Machines using LSI Logic emulation.
- Present iSCSI storage to a Virtual Machine either as a data store created on an iSCSI device, or raw device mapping.

Configuring multipath with the Solaris 10 iSCSI initiator

This section explains how to configure multipath with the Solaris 10 iSCSI initiator to the MPX200.

For details on managing and troubleshooting Solaris iSCSI multipath devices, see the *Solaris System Administration Guide: Devices and File Systems*, available at <http://dlc.sun.com/pdf/817-5093/817-5093.pdf>.

MPxIO overview

The Sun multipathing software (MPxIO) provides basic failover and load-balancing capability to HP EVA4000/6000/8000 and EVA4100/6100/8100 storage arrays. MPxIO allows the merging of multiple SCSI layer paths, such as an iSCSI device exposing the same LUN through several different iSCSI target names. Because MPxIO is independent of transport, it can multipath a target

that is visible on both iSCSI and FC ports. This section describes only the iSCSI implementation of MPxIO with the MPX200.

For more information about MPxIO, see the *Solaris Fibre Channel and Storage Multipathing Administration Guide*, available at <http://docs.sun.com/source/819-0139>.

Preparing the host system

To verify that MPxIO is enabled:

1. Enter the following command:

```
cat kernel/drv/iscsi.conf
```

2. Verify the MPxIO setting:

```
mpxio-disable="no"
```

If the setting is yes, change it to no, and then reboot:

```
Reboot -- -r
```

Example: MPxIO on all iSCSI port settings in /kernel/dev/iscsi.conf

```
# Copyright 2006 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
#ident "@(#) iscsi.conf 1.2 06/06/12 SMI"
name="iscsi" parent="/" instance=0;
ddi-forceattach=1;
#
# I/O multipathing feature (MPxIO) can be enabled or disabled using
# mpxio-disable property. Setting mpxio-disable="no" will activate
# I/O multipathing; setting mpxio-disable="yes" disables the feature.
#
# Global mpxio-disable property:
#
# To globally enable MPxIO on all iscsi ports set:
# mpxio-disable="no";#
# To globally disable MPxIO on all iscsi ports set:
# mpxio-disable="yes";
#
mpxio-disable="no";
#
```

Enabling MPxIO for an HP P6000 EVA storage array

This section explains how to configure a Solaris server to recognize an HP storage array in an iSCSI multipath environment with the MPX200.

Editing the scsi_vhci.conf file

HP storage arrays are supported with MPxIO:

- As symmetric devices only
- With no load balancing
- With no fallback

To configure MPxIO for HP storage arrays, you must add information to the /kernel/drv/scsi_vhci.conf file:

1. Use a text editor to modify the configuration file. For example:

```
# vi /kernel/drv/scsi_vhci.conf
```

2. Change load balancing to none:

```
load-balance="none";
```

3. Change auto-failback to disable:
`auto-failback="disabled";`
4. Add the following lines for the EVA4x00/6x00/8x00 storage arrays:

```
device-type-scsi-options-list =
"HP      HSV", "symmetric-option";
symmetric-option = 0x1000000;
```

NOTE: You must enter six spaces between HP and HSV.

Example: HP storage array settings in /kernel/drv/scsi_vhci.conf

```
# Copyright 2004 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
#pragma ident  "@(#)scsi_vhci.conf      1.9      04/08/26 SMI"
#
name="scsi_vhci" class="root";
#
# Load balancing global configuration: setting load-balance="none" will cause
# all I/O to a given device (which supports multipath I/O) to occur via one
# path. Setting load-balance="round-robin" will cause each path to the device
# to be used in turn.
#
load-balance="none";
#
# Automatic fallback configuration
# possible values are auto-failback="enable" or auto-failback="disable"
auto-failback="disabled";
#
# For enabling MPxIO support for 3rd party symmetric device need an
# entry similar to following in this file. Just replace the "SUN      SENA"
# part with the Vendor ID/Product ID for the device, exactly as reported by
# Inquiry cmd.
#
device-type-scsi-options-list =
"SEN      SENA", "symmetric-option";
#
symmetric-option = 0x1000000;
#
device-type-scsi-options-list =
"HP      HSV", "symmetric-option";
symmetric-option = 0x1000000;
```

5. Reboot to activate the changes:

```
# reboot -- -r
```

Editing the sgen.conf file

To ensure that the HP storage arrays are recognized by Solaris as SCSI controllers, you must add information to the /kernel/drv/sgen.conf file:

1. Use a text editor to modify the configuration file. For example:

```
# vi /kernel/drv/sgen.conf
```

2. Add array_ctrl to device-type-config-list:

```
device-type-config-list="array_ctrl";
```

3. Uncomment all target/LUN pair entries.

Example: HP storage array settings in /kernel/drv/sgen.conf

```
.
.
.

# devices on your system. Please refer to sgen(7d) for details.
```

```

#
# sgen may be configured to bind to SCSI devices exporting a particular device
# type, using the device-type-config-list, which is a ',' delimited list of
# strings.
#
device-type-config-list="array_ctrl";
.

.

# After configuring the device-type-config-list and/or the inquiry-config-list,
# the administrator must uncomment those target/lun pairs at which there are
# devices for sgen to control. If it is expected that devices controlled by
# sgen will be hotplugged or added into the system later, it is recommended
# that all of the following lines be uncommented.

name="sgen" class="scsi" target=0 lun=0;
name="sgen" class="scsi" target=1 lun=0;
name="sgen" class="scsi" target=2 lun=0;
name="sgen" class="scsi" target=3 lun=0;
name="sgen" class="scsi" target=4 lun=0;
name="sgen" class="scsi" target=5 lun=0;
name="sgen" class="scsi" target=6 lun=0;
name="sgen" class="scsi" target=7 lun=0;
name="sgen" class="scsi" target=8 lun=0;
name="sgen" class="scsi" target=9 lun=0;
name="sgen" class="scsi" target=10 lun=0;
name="sgen" class="scsi" target=11 lun=0;
name="sgen" class="scsi" target=12 lun=0;
name="sgen" class="scsi" target=13 lun=0;
name="sgen" class="scsi" target=14 lun=0;
name="sgen" class="scsi" target=15 lun=0;

```

Creating an sgen driver alias

The HP storage array is a self-identifying SCSI device and must be bound to the sgen driver using an alias. Execute the following procedure to create an sgen driver alias:

1. Update the sgen driver:

```
# update_drv -a -I "scsiclass,0c" sgen
```

NOTE: Lowercase c is mandatory.

2. Verify the sgen alias setting:

```
#egrep sgen /etc/driver_aliases
```

Example:

```
# rep sgen /etc/driver_aliases
sgen "scsa,08.bfc"
sgen "scsa,08.bvhci"
sgen "scsiclass,0c"
```

Enable iSCSI target discovery

Solaris supports three iSCSI target discovery methods:

- SendTargets
- Static
- iSNS

This section describes SendTargets discovery only. For information on static and iSNS discovery, see <http://docs.sun.com/app/docs/doc/817-5093/fqnlk?l=en&=view>.

To enable iSCSI target discovery:

1. Enter the following command:

```
# iscsiadadm modify discovery -t enable
```

2. Verify that SendTargets is enabled:


```
# iscsiadm list discovery
```
3. The MPX200 has multiple iSCSI ports available to the Solaris iSCSI initiator. To discover the targets available, enter the following command for each iSCSI port IP address that the iSCSI initiator accesses:


```
#iscsiadm add discovery-address 'iscsi port IP address'
```
4. Verify the discovery address entries:


```
#iscsiadm list discovery-address
```
5. After discovery addresses are entered, the Solaris iSCSI initiator polls each address for all targets available. To list the targets available to the initiator, enter the following command:


```
#iscsiadm list target
```

Example:

```
#iscsiadm list target
Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b2.01.50014380025c4179
  Alias: -
  TPGT: 0
  ISID: 4000002a0000
  Connections: 1
Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d
  Alias: -
  TPGT: 0
  ISID: 4000002a0000
  Connections: 1
```

NOTE: The iSCSI initiator must discover all targets presented by each MPX200 iSCSI port that will be used in a multipath configuration.

6. Create the iSCSI device links for the local system:

```
# devfsadm -i iscsi
```

Modifying the target parameter MaxRecvDataSegLen

Sun recommends that you set the MaxRecvDataSegLen parameter to 65,536 bytes for each iSCSI discovered target. For more information, see <http://wikis.sun.com/display/StorageDev/iSCSI+Features+Related+to+RFC+3720+Parameters>.

To modify the target parameter MaxRecvDataSegLen:

1. List all iSCSI targets:


```
#iscsiadm list target-param
```
2. Change the value of MaxRecvDataSegLen to 65536 for each target:


```
#iscsiadm modify target-param -p maxrecvdataseglen=65536 'target iqn'
```

3. Use the following example to verify the target setting:

```
# iscsiadadm list target-param
Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d

# iscsiadadm modify target-param -p maxrecvdataseglen=65536 iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d

# iscsiadadm list target-param -v iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d
Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d
    Alias: -
    Bi-directional Authentication: disabled
    Authentication Type: NONE
    Login Parameters (Default/Configured):
        Data Sequence In Order: yes/-
        Data PDU In Order: yes/-
        Default Time To Retain: 20/-
        Default Time To Wait: 2/-
        Error Recovery Level: 0/-
        First Burst Length: 65536/-
        Immediate Data: yes/-
        Initial Ready To Transfer (R2T): yes/-
        Max Burst Length: 262144/-
        Max Outstanding R2T: 1/-
        Max Receive Data Segment Length: 8192/65536
        Max Connections: 1/-
        Header Digest: NONE/-
        Data Digest: NONE/-
    Configured Sessions: 1
```

Monitoring the multipath devices

After HP P6000 Command View has presented the virtual disks to the Solaris host, enter the following commands to monitor the configuration:

1. **iscsiadm list target -S**

This command lists targets with their presented LUNs. In a multipath environment, the same LUN should appear under different P6000 EVA port targets from the same controller.

Example:

```
iscsiadm list target -S
Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b2.01.50014380025c4179
    Alias: -
    TPGT: 0
    ISID: 4000002a0000
    Connections: 1
    LUN: 120
        Vendor: HP
        Product: HSV300
        OS Device Name: /dev/rdsck/c5t600508B4000B15A200005000038E0000d0s2

Target: iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.b1.01.50014380025c417d
    Alias: -
    TPGT: 0
    ISID: 4000002a0000
    Connections: 1
    LUN: 120
        Vendor: HP
        Product: HSV300
        OS Device Name: /dev/rdsck/c5t600508B4000B15A200005000038E0000d0s2
```

2. **mpathadm list lu**

This command displays the total and operational path count for each logical unit. It displays both the controller and device path counts.

Example:

```
#mpathadm list lu
    /scsi_vhci/array-controller@g50014380025c4170
        Total Path Count: 2
        Operational Path Count: 2
```

```
/dev/rdsk/c5t600508B4000B15A200005000038E0000d0s2
Total Path Count: 2
```

3. **mpathadm show lu logical-unit**

This command displays details about a logical unit. Use this command to verify symmetric mode, load balancing, and auto-failback settings, as well as path and target port information.

Example:

```
#mpathadm show lu /dev/rdsk/c5t600508B4000B15A200005000038E0000d0s2
Logical Unit: /dev/rdsk/c5t600508B4000B15A200005000038E0000d0s2
  mpath-support: libmpscsi_vhci.so
  Vendor: HP
  Product: HSV300
  Revision: 0005
  Name Type: unknown type
  Name: 600508b4000b15a200005000038e0000
  Asymmetric: no
  Current Load Balance: none
  Logical Unit Group ID: NA
  Auto Failback: off
  Auto Probing: NA

  Paths:
    Initiator Port Name: iqn.1986-03.com.sun:01:sansun-s04,4000002a00ff
    Target Port Name: 4000002a0000,iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.
b2.01.50014380025c4179
    Override Path: NA
    Path State: OK
    Disabled: no

    Initiator Port Name: iqn.1986-03.com.sun:01:sansun-s04,4000002a00ff
    Target Port Name: 4000002a0000,iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.
b1.01.50014380025c417d
    Override Path: NA
    Path State: OK
    Disabled: no

    Target Ports:
      Name: 4000002a0000,iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.
b2.01.50014380025c4179
      Relative ID: 0

      Name: 4000002a0000,iqn.1986-03.com.hp:fcgw.mpx200.0834e00028.
b1.01.50014380025c417d
      Relative ID: 0
```

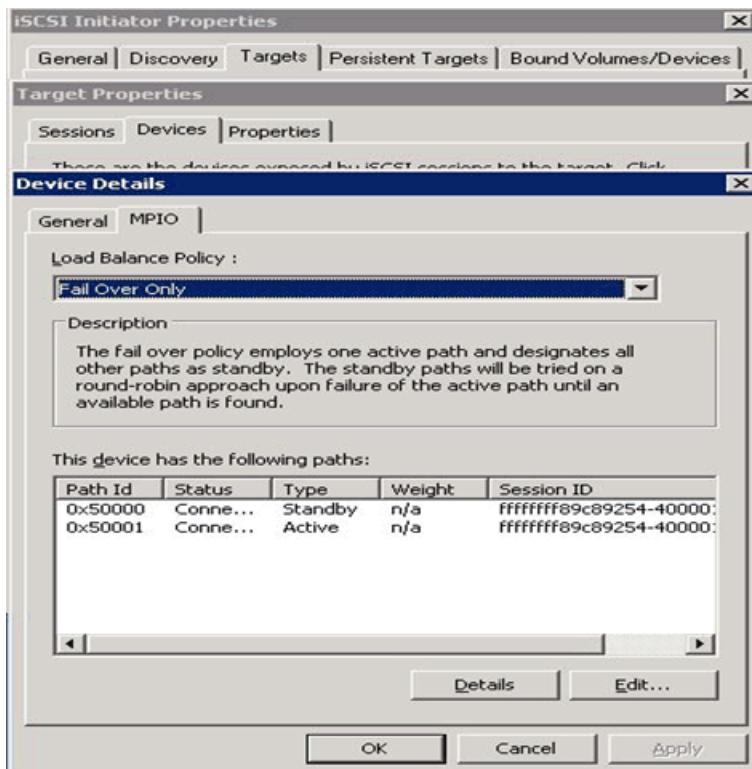
Configuring Microsoft MPIO iSCSI devices

For Microsoft MPIO, the load-balance policies apply to each LUN individually. To display and modify the LUN load-balance policy ([Figure 80 \(page 90\)](#)):

1. Start the Microsoft iSCSI Control Panel applet.
2. Select the **Target** tab.
3. Click **Details**.
4. Click **Devices**.
5. Highlight a LUN device name, and then click **Advanced**.
6. Select the **MPIO** check box.

7. Select the desired options on the **Load Balance Policy** menu.

Figure 80 iSCSI Initiator MPIO properties



Microsoft MPIO for iSCSI load-balancing policies

The Microsoft MPIO for iSCSI load-balancing policies are as follows:

- **Failover Only.** No load balancing is performed. There is a single active path; the remaining paths are standby paths. The active path sends all I/O. If the active path fails, a standby path is used. When the formerly active path is reconnected, it becomes active and the activated standby path returns to standby.
- **Round-robin.** All paths are active paths and are used to send I/O in a round-robin fashion.
- **Round-robin with a subset of paths.** One set of paths is configured as active and another set of paths is configured as standby. I/O is sent in a round-robin fashion over the active paths. If all active paths fail, a standby path is used. When a formerly active path is reconnected, it becomes active and the activated standby path returns to standby.
- **Weighted Path.** Each path is assigned a weight and I/O is sent on the path with the lowest weight. If the path with the lowest weight fails, the path with the next lowest weight is used.
- **Least Queue Depth.** This is not supported by MPIO.

NOTE: For raw disk access, the MPIO load-balancing policy must be Failover Only. For file system disk access, all MPIO load-balancing policies are supported. Failover policies are set on a LUN-by-LUN basis. MPIO does not support global failover settings.

Microsoft MPIO with QLogic iSCSI HBA

The QLogic iSCSI HBA is supported in a multipath Windows configuration that is used in conjunction with Microsoft iSCSI initiator services and Microsoft MPIO. Because the iSCSI driver resides on the QLogic iSCSI HBA, it is not necessary to install the Microsoft iSCSI initiator.

Installing the QLogic iSCSI HBA

Install the QLogic iSCSI HBA hardware and software following the instructions in the QLogic installation manual. The QLogic iSCSI HBA is managed by the QLogic SANsurfer Management Suite (SMS).

NOTE: After installing the QLogic iSCSI HBA, you must configure the QLogic iSCSI initiator through SMS. The QLogic iSCSI HBA does not appear in the Microsoft Network Connection device list.

Installing the Microsoft iSCSI initiator services and MPIO

To install the Microsoft iSCSI initiator:

1. Access the Microsoft iSCSI Initiator Installation page of the Software Update Installation Wizard ([Figure 81 \(page 91\)](#)).

Figure 81 Microsoft iSCSI Initiator Installation page



! **IMPORTANT:** Do not select the **Software Initiator** check box. The QLogic initiator resides on the iSCSI HBA.

2. Reboot the system.

Configuring the QLogic iSCSI HBA

To configure the QLogic iSCSI HBA:

1. Launch the QLogic SMS from the desktop icon or through **Start > Programs**, and connect to the local host ([Figure 82 \(page 92\)](#)).

- Click **Yes** to launch the general configuration wizard (Figure 83 (page 92)). Use the wizard to:
 - Select **iSCSI HBA** port to configure the QLogic iSCSI HBA.
 - Configure the HBA Port network settings.
 - Configure the HBA Port DNS settings (optional).
 - Configure the SLP Target Discovery settings (optional).
 - Configure the iSNS Target Discovery settings (optional).

Figure 82 Connect to Host window

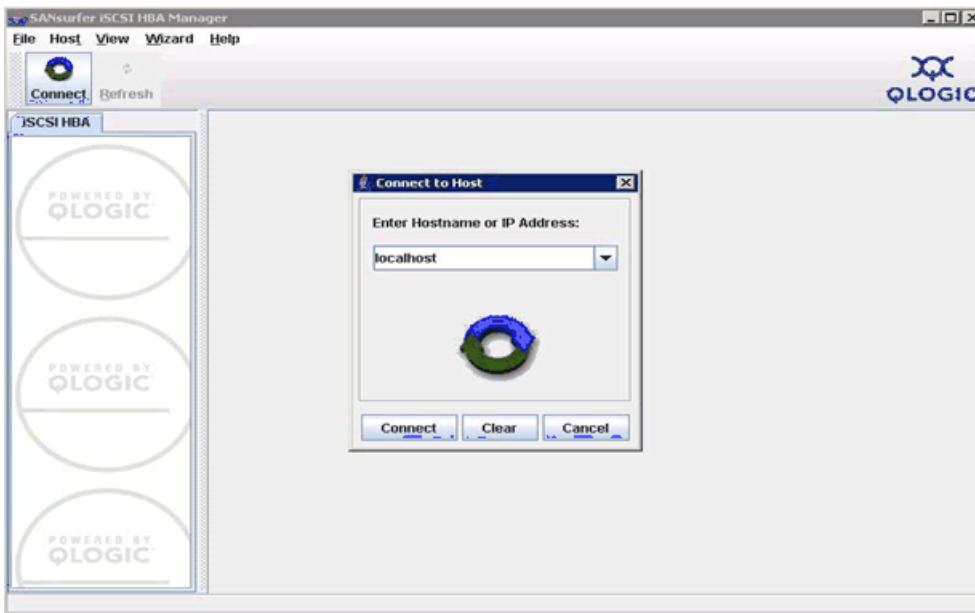
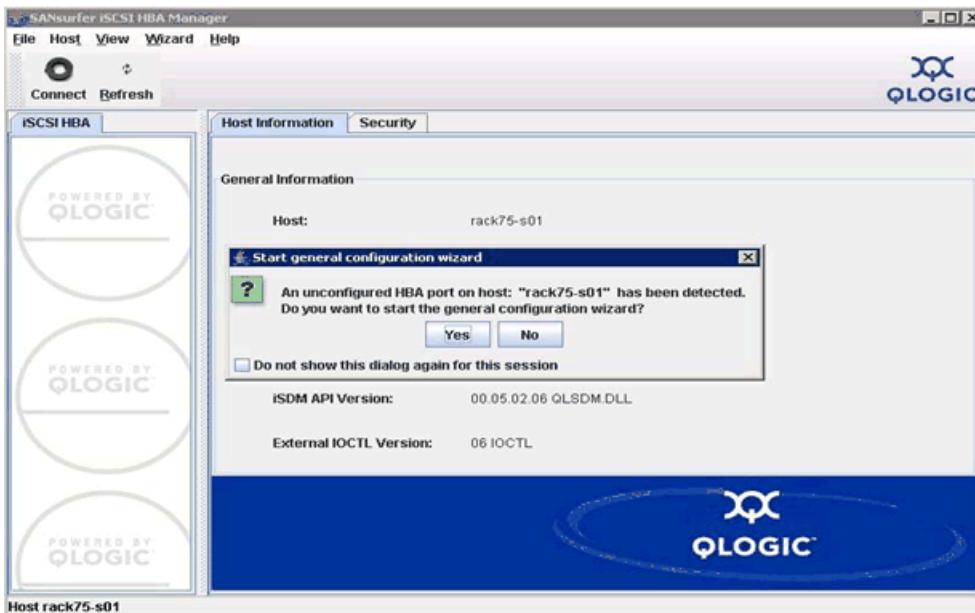


Figure 83 Start general configuration wizard

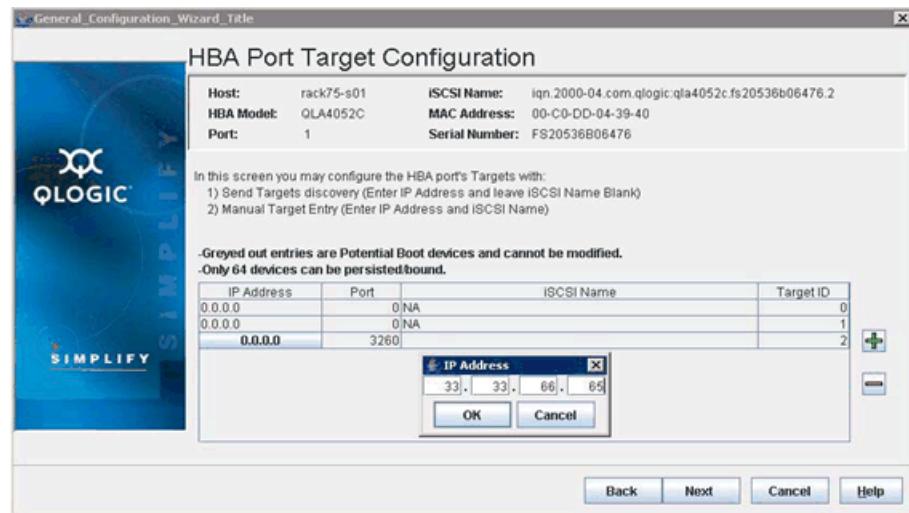


Adding targets to the QLogic iSCSI initiator

To add HBA port targets:

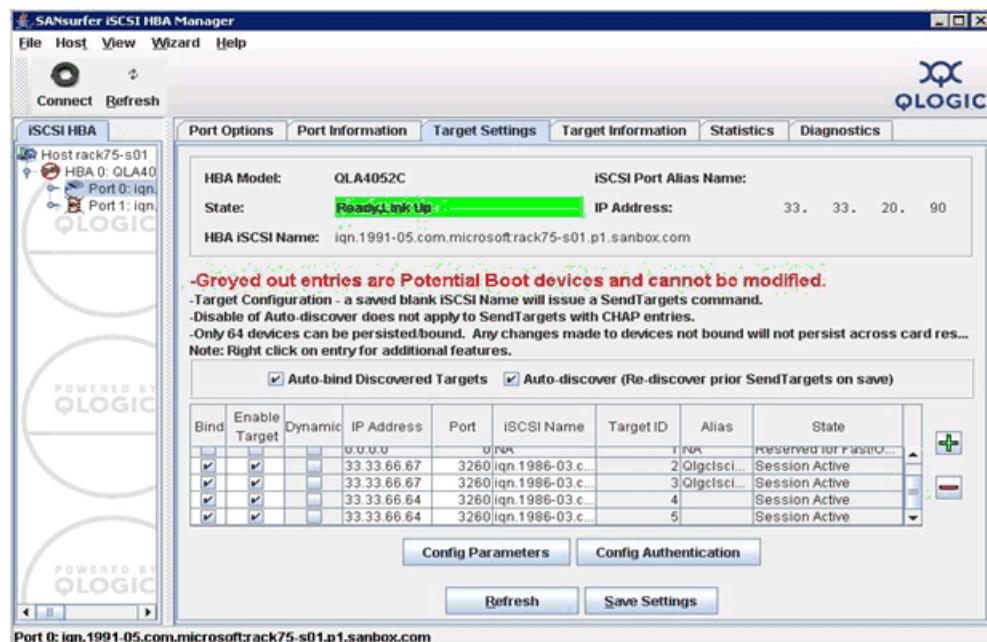
1. Click the green plus sign (Figure 84 (page 93)).
2. Enter the first iSCSI target port IP address.

Figure 84 HBA Port Target Configuration window



3. Repeat steps 1 and 2 for each MPX200 you want to add.
4. Click **Next**.
5. To activate the changes, enter the SMS password: **config**.
6. Select the **Target Settings** tab. Verify that the HBA state is Ready, Link Up and that each target entry state is Session Active (Figure 85 (page 93)).

Figure 85 Target Settings tab

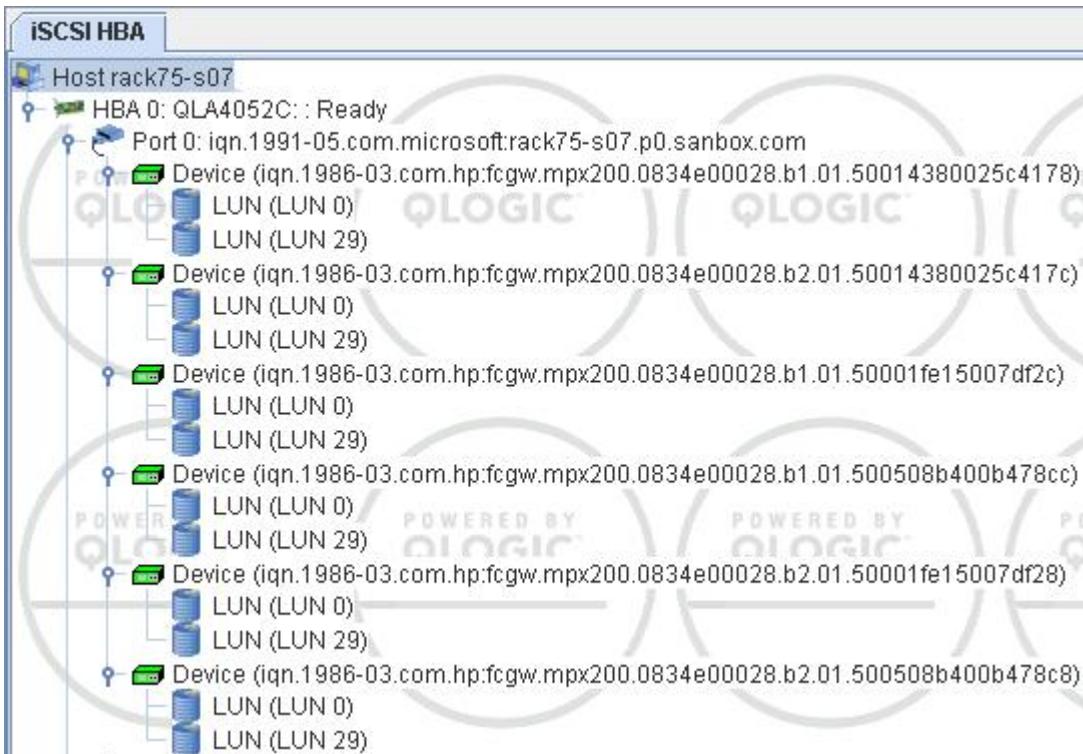


Presenting LUNs to the QLogic iSCSI initiator

To present LUNs to the QLogic iSCSI initiator:

1. Follow the procedure in [Step 4](#) to:
 - Create an iSCSI host.
 - Present LUNs to the iSCSI host.
2. On the **iSCSI HBA** tab ([Figure 86 \(page 94\)](#)), verify that the QLogic iSCSI HBA is connected to the iSCSI LUNs in SMS under the HBA iSCSI port.

Figure 86 iSCSI HBA port connections



Use the Microsoft iSCSI initiator services to manage the iSCSI target login and LUN load-balancing policies.

Installing the HP MPIO Full Featured DSM for P6000 EVA

Follow the procedure in the Installation and Reference Guide, available at <http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&lang=en&cc=us&docIndexId=64179&taskId=101&prodTypeld=18964&prodSeriesId=421492>.

After installing the HP MPIO Full Featured DSM for P6000 EVA, open Computer Management to view and control the iSCSI LUNs ([Figure 87 \(page 95\)](#)).

Figure 87 HP MPIO DSM Manager with iSCSI devices

Controller	SCSI Port	HBA Slot	B-T-L	Mode	State	Load Balance Policy	ALB
PBA23D995V00EG-4	5	iSCSI port	0-10-162	-	Active	Shortest Queue Service Time (SQST)	N
PBA23D995V00D2-4	5	iSCSI port	0-11-162	-	Active	Shortest Queue Service Time (SQST)	N
PBA23D995V00EG-4	5	iSCSI port	0-14-162	-	Active	Shortest Queue Service Time (SQST)	N
PBA23D995V00D2-4	5	iSCSI port	0-15-162	-	Active	Shortest Queue Service Time (SQST)	N

Microsoft Windows Cluster support

Microsoft Cluster Server for Windows 2003

iSCSI Failover clustering is supported on the HP StorageWorks MPX200 Multifunction Router. For more information, see <http://www.microsoft.com/windowsserver2003/technologies/storage/iscsi/iscsicluster.mspx>.

Requirements

- **Operating system:** Windows Server 2003 Enterprise, SP2, R2, x86/x64
- **Firmware:** Minimum version—3.1.0.0, released November 2009
- **Initiator:**
 - Persistent Reservation registry key—for Microsoft Generic DSM
 - Multiple NIC/iSCSI HBA ports—four recommended:
 - one public
 - one private
 - two storage, for higher availability and performance
 - MPIO—use HP DSM or the Microsoft Generic DSM
 - HP recommends using the latest available DSM
- **Connectivity:** Dual blade configuration for redundancy

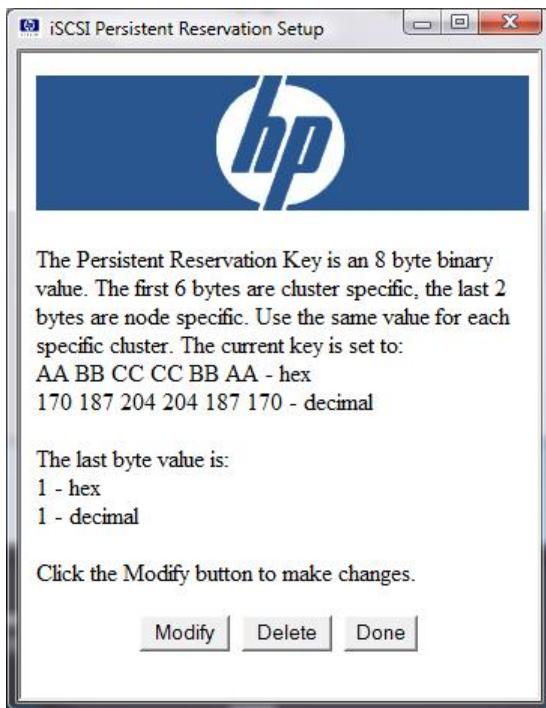
Setting the Persistent Reservation registry key

The iSCSI Persistent Reservation Setup utility assists you in creating the proper registry settings for use with the *Microsoft Generic DSM* and *Microsoft Cluster Server*. This **must** be run on every node of the cluster.

1. Run `PRset.hta` to start the application.
This automatically adds the registry key and values seen.
2. Click **Modify** to make changes. See “iSCSI Persistent Reservation Setup” (page 96).

3. Click **Done** to finish.

Figure 88 iSCSI Persistent Reservation Setup



Each cluster is required to have its own value, and each node of a single cluster must have its own value. For example, Cluster A could have the default setting of AABBCCCCBAA. [Table 14 \(page 96\)](#) shows possible node settings.

Table 14 Node settings

Node	Value
Node 1	1
Node 2	2
Node 3	3
Node 4	4

When the *HP Full Featured DSM for P6000 EVA* is installed, Persistent Reservation is set in the registry by default. For more information on the HP DSM, see <http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&lang=en&cc=us&docIndexId=64179&taskId=101&prodTypId=18964&prodSeriesId=421492>

Microsoft Cluster Server for Windows 2008

iSCSI Failover clustering is supported on the HP MPX200 Multifunction Router. For more information, see <http://technet.microsoft.com/en-us/library/cc754482.aspx>.

Requirements

- **Operating system:** Windows Server 2008 Enterprise, SP2, R2, x86/x64
- **Firmware:** Minimum version—3.1.0.0, released November 2009

- **Initiator:**
 - Multiple NIC/iSCSI HBA ports—four recommended
 - one public
 - one private
 - two storage, for higher availability and performance
 - MPIO - use HP DSM or the Microsoft Generic DSM
 - HP recommends using the latest available
- **Connectivity:** Dual blade configuration for redundancy

Setting up authentication

Challenge Handshake Authentication Protocol (CHAP) is an authentication protocol used for secure login between the iSCSI initiator and iSCSI target. CHAP uses a challenge-response security mechanism to verify the identity of an initiator without revealing the secret password shared by the two entities. It is also referred to as a three-way handshake. With CHAP, the initiator must prove to the target that it knows the shared secret without actually revealing the secret. You can configure CHAP on the MPX200.

NOTE: Setting up authentication for your iSCSI devices is optional. If you require authentication, HP recommends that you configure it after you have properly verified installation and operation of the iSCSI implementation without authentication.

In a secure environment, authentication may not be required—access to targets is limited to trusted initiators. In a less secure environment, the target cannot determine if a connection request is from a certain host. In this case, the target can use CHAP to authenticate an initiator.

When an initiator contacts a target that uses CHAP, the target (called the *authenticator*) responds by sending the initiator a challenge. The challenge consists of information that is unique to the authentication session. The initiator encrypts this information using a previously issued password that is shared by both the initiator and the target. The encrypted information is then returned to the target. The target has the same password and uses it as a key to encrypt the information that it originally sent to the initiator. The target compares its results with the encrypted results sent by the initiator; if they are the same, the initiator is considered authentic. These steps are repeated throughout the authentication session to verify that the correct initiator is still connected.

These schemes are called proof-of-possession protocols. The challenge requires that an entity prove possession of a shared key or one of the key pairs in a public-key scheme.

See the following RFCs for detailed information about CHAP:

- RFC 1994 (PPP Challenge Handshake Authentication Protocol, August 1996)
- RFC 2433 (Microsoft PPP CHAP Extensions, October 1998)
- RFC 2759 (Microsoft PPP CHAP Extensions version 2, January 2000)

General CHAP restrictions

The CHAP restrictions are:

- Maximum length of 100 characters
- Minimum length of 1 character
- Entering an IQN using the HP P6000 Command View add host tab requires the iSCSI initiator to have been registered in the iSCSI or iSCSI/FCoE module's initiator database.

Microsoft initiator CHAP secret restrictions

The Microsoft initiator CHAP secret restrictions are:

- Maximum length of 16 characters
- Minimum length of 12 characters
- When an initiator uses iSNS for target discovery, only normal session CHAP applies

NOTE: There is no restriction on the type of characters that can be entered.

Linux CHAP restrictions

The Linux CHAP restrictions are:

- CHAP is supported with the Linux `open-iscsi` initiator and MPX200.
- CHAP setup with Linux iSCSI initiator is not supported with the MPX200.

ATTO Macintosh CHAP restrictions

The ATTO Macintosh iSCSI initiator does not support CHAP at this time.

Recommended CHAP policies

The following CHAP policies are recommended:

- The same CHAP secret should not be configured for authentication of multiple initiators or targets.
- Any CHAP secret used for initiator authentication must not be configured for authentication of any target. Any CHAP secret used for target authentication must not be configured for authentication of any initiator.
- CHAP should be configured after the initial iSCSI initiator/target login to validate initiator/target connectivity. The first initiator/target login creates a discovered iSCSI initiator entry on the MPX200 that is used in the CHAP setup.

iSCSI session types

iSCSI defines two types of sessions:

- **Discovery**—SCSI discovery enables an initiator to find the targets to which it has access.
- **Normal**—A normal session is unrestricted.

CHAP is enforced on both discovery and normal sessions.

MPX200 CHAP modes

The MPX200 supports two CHAP modes. Once CHAP is enabled, it is enforced for both discovery sessions and normal sessions. You can choose only the CHAP mode:

- **Single-direction**—The target authenticates the identity of the initiator with the user-provided CHAP secret. To enable single-direction CHAP, you must enable CHAP for a specific initiator record on the MPX200 and enter a corresponding CHAP secret from the iSCSI host.
- **Bidirectional**—The initiator and target authenticate each other's identity by using the user-provided CHAP secrets. To enable bidirectional CHAP for a discovery session, you must provide a CHAP secret for the initiator and for the iSCSI port for which you are performing discovery. To enable bidirectional CHAP for a normal session, you must provide a CHAP secret for the initiator and for the iSCSI-presented target that you want to log in to.
- Single-direction CHAP during discovery session and during normal session
- Single-direction CHAP during discovery session and bidirectional CHAP during normal session

- Bidirectional CHAP during discovery session and single-direction CHAP during normal session
- Bidirectional CHAP during discovery session and during normal session

Enabling single-direction CHAP during discovery session and normal session

Table 15 (page 99) lists the settings you use to enable single-direction CHAP during a discovery session and normal session.

Table 15 CHAP single-direction settings

MPX200 secret settings ¹		Microsoft initiator secret settings ¹	
Source	Setting (example)	Action	Setting (example)
iSCSI Port	N/A	General Tab Secret	N/A
Discovered iSCSI Initiator	CHAPsecret01	Add Target Portal	CHAPsecret01
iSCSI Presented Target	N/A	Log on to Target	CHAPsecret01

¹ These are examples of secret settings. Configure CHAP using settings that apply to your network environment.

To enable CHAP for the MPX200-discovered iSCSI initiator entry:

- If the iSCSI initiator is *not* listed when you execute the `set chap` command, do one of the following:
 - From HP P6000 Command View, select **Hosts**, and then select the **Add Host** tab. Enter the IQN string.
 - From the CLI, use the `add` command to add the iSCSI initiator that will perform the discovery.
- If the iSCSI initiator *is* listed when you execute the `set chap` command, then enable the CHAP secret (for example, CHAPsecret01):
 1. Select the index of the iSCSI initiator.
 2. Enable CHAP by selecting 0 and then entering the CHAP secret.
- To enable CHAP for the Microsoft iSCSI initiator:
 1. Click **Discovery**
 - To discover iSCSI target portals manually:
 - a. Click **Add** under Target Portals.
 - b. Enter the IP address of the MPX200 iSCSI port.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret for the MPX200-discovered iSCSI initiator in the Target Secret box (for example, CHAPsecret01).
 - f. Click **OK**.

The initiator completes target discovery.

 - To discover iSCSI target portals using iSNS:
 - a. Click **Add** under iSNS Servers.
 - b. Enter the IP address of the iSNS server.
 - c. Click **OK**.
 2. Click **Targets**, and then select the appropriate target for login.
 3. Click **Log On**.
 4. Click **Advanced**.
 5. Select the **CHAP Login Information** check box.

6. Enter the CHAP secret for the MPX200-discovered iSCSI initiator in the Target Secret box.
7. Click **OK**.
8. Click **OK** again.

The initiator completes normal login.

Enabling CHAP for the MPX200-discovered iSCSI initiator entry

You must use the CLI to enable CHAP for the MPX200-discovered iSCSI initiator entry:

- If the iSCSI initiator is *not* listed when you execute the `set chap` command, do one of the following:
 - From HP P6000 Command View, select **Hosts**, and then select the **Add Host** tab. Enter the IQN string.
 - From the CLI, use the `add` command to add the iSCSI initiator that performs the discovery.
- If the iSCSI initiator *is* listed when you execute the `set chap` command, then enable the CHAP secret (for example, CHAPsecret01):
 1. Select the index of the iSCSI initiator.
 2. Enable CHAP by selecting 0 and then entering the CHAP secret.

Enabling CHAP for the Microsoft iSCSI initiator

To enable CHAP for the Microsoft iSCSI initiator:

1. Click **Discovery**. To manually discover iSCSI target portals:
 - a. Click **Add** under Target Portals.
 - b. Enter the IP address of the iSCSI port of the MPX200.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret for the MPX200-discovered iSCSI initiator in the **Target Secret** box (for example, CHAPsecret01).
 - f. Click **OK** and the initiator completes Target discovery. Using iSNS for target discovery:
 - Click **Add** under iSNS Servers.
 - Enter the IP address of the iSNS server.
 - Click **OK**.
2. Click **Targets** and select the appropriate target for login.
3. Click **Log On** and then click **Advanced**.
4. Select the **CHAP Login Information** check box.
5. Enter the CHAP secret for the MPX200-discovered iSCSI initiator in the **Target Secret** box.
6. Click **OK**.
7. Click **OK** again.

Enabling CHAP for the open-iscsi iSCSI initiator

To enable CHAP for the open-iscsi iSCSI initiator:

1. Edit the `/etc/iscsi/iscsid.conf` file:

- a. Enable CHAP for both discovery and normal sessions:

```
discovery.sendtargets.auth.authmethod=CHAP
node.session.auth.authmethod=CHAP
```

- b. Set up the user name and password for the initiator for a normal session. For example:

```
# To set a CHAP username and password for initiator
# authentication by the target(s), uncomment the following lines:
#node.session.auth.username = username
#node.session.auth.password = password
node.session.auth.username = iqn.1994-05.com.redhat:fc813cac13.sanergy33
node.session.auth.password = CHAPSecret01
```

- c. Set up the user name and password for the initiator for a discovery session. For example:

```
# To set a discovery session CHAP username and password for the initiator
# authentication by the target(s), uncomment the following lines:
#discovery.sendtargets.auth.username = username
#discovery.sendtargets.auth.password = password
discovery.sendtargets.auth.username = iqn.1994-05.com.redhat:fc813cac13.sanergy33
discovery.sendtargets.auth.password = CHAPSecret01
```

2. Save the `/etc/iscsi/iscsid.conf` file and start or restart iSCSI:

```
[root@sanergy33 iscsi]# /etc/init.d/iscsi start or /etc/init.d/iscsi
restart
```

3. Use the `iscsiadm` command to perform a discovery. For example:

```
[root@sanergy33 iscsi]# iscsiadm -m discovery -t sendtargets -p
10.10.1.23
```

4. Use the `iscsiadm` command to log in to the iSCSI target. For example:

```
[root@sanergy33 iscsi]# iscsiadm --mode node --targetname
iqn.1986-03.com.hp:fcgw.mpx200.0840e00002.
b1.01.50001fe15006ac39 --login
```

The following is a sample `iscsid.conf` file for CHAP:

```
# ****
# CHAP Settings
# ****

# To enable CHAP authentication set node.session.auth.authmethod
# to CHAP. The default is None.
#node.session.auth.authmethod = CHAP
node.session.auth.authmethod = CHAP

# To set a CHAP username and password for initiator
# authentication by the target(s), uncomment the following lines:
#node.session.auth.username = username
node.session.auth.username = iqn.1994-05.com.redhat:fc813cac13.sanergy33
#node.session.auth.password = password
node.session.auth.password = CHAPSecret01

# To set a CHAP username and password for target(s)
# authentication by the initiator, uncomment the following lines:
#node.session.auth.username_in = username_in
#node.session.auth.password_in = password_in

# To enable CHAP authentication for a discovery session to the target
# set discovery.sendtargets.auth.authmethod to CHAP. The default is None.
#discovery.sendtargets.auth.authmethod = CHAP
node.session.auth.authmethod = CHAP
```

```

# To set a discovery session CHAP username and password for the initiator
# authentication by the target(s), uncomment the following lines:
#discovery.sendtargets.auth.username = username
discovery.sendtargets.auth.username = iqn.1994-05.com.redhat:fc813cac13.sanergy3
3
#discovery.sendtargets.auth.password = password
discovery.sendtargets.auth.password = CHAPSecret01

# To set a discovery session CHAP username and password for target(s)
# authentication by the initiator, uncomment the following lines:
#discovery.sendtargets.auth.username_in = username_in
#discovery.sendtargets.auth.password_in = password_in

```

Enabling single-direction CHAP during discovery session and bidirectional CHAP during normal session

Table 16 (page 102) lists the settings you use to enable single-direction CHAP during a discovery session and bidirectional CHAP during a normal session.

Table 16 CHAP single-direction settings

MPX200 secret settings		Microsoft initiator secret settings	
Source	Setting (example)	Action	Setting (example)
iSCSI Port	N/A	General Tab Secret	hpstorageworks
Discovered iSCSI Initiator	CHAPsecret01	Add Target Portal	CHAPsecret0
iSCSI Presented Target	hpstorageworks	Log on to Target	CHAPsecret01

NOTE: These are examples of secret settings. Configure CHAP using settings that apply to your network environment.

1. Enable CHAP for the MPX200 discovered iSCSI initiator entry (CHAP can be enabled via CLI only).
 - a. If the iSCSI initiator is not listed under the `set chap` command, do one of the following:
 - From HP P6000 Command View, select **Hosts**, and then select the **Add Host** tab. Enter the IQN name string.
 - From the CLI, use the `add` command to add the iSCSI initiator that will perform the discovery.
 - b. If the iSCSI initiator is listed when you execute the `set chap` command, then enable CHAP secret (for example: CHAPsecret01).
 - Select the index of the iSCSI initiator.
 - Enable CHAP by selecting 0, and then entering the CHAP secret.
2. Enable CHAP for the MPX200 iSCSI presented target:
 - a. Enter the `set chap` command.
 - b. Select the Presented Target the initiator will log in to.
 - c. Enable CHAP and enter a CHAP secret. For example: hpstorageworks

3. Enable CHAP for the Microsoft iSCSI initiator.
 - a. Select the **General** tab.
 - b. Click **Secret** in the middle of the screen.
 - c. Click **Reset**.
 - d. Enter the MPX200 iSCSI Presented Target CHAP secret (for example: `hpstorageworks`).
 - e. Click **Discovery**.
 - To discover iSCSI target portals manually:
 - a. Click **Add** under **Target Portals**.
 - b. Enter the IP address of the iSCSI port of the MPX200.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example: `CHAPsecret01`).
 - f. Click **OK**.
 - The initiator completes target discovery.
 - Using iSNS for target discovery:
 - a. Click **Add** under **iSNS Servers**.
 - b. Enter the IP address of the iSNS server.
 - c. Click **OK**.
 - f. Click **Targets**.
 - g. Select the appropriate target for login.
 - h. Click **Log On**.
 - i. Click **Advanced**.
 - j. Select the **CHAP Login Information** check box.
 - k. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example: `CHAPsecret01`).
 - l. Select the **Mutual Authentication** check box.
 - m. Click **OK**.
 - n. Click **OK** and the initiator completes normal login.

Enabling bidirectional CHAP during discovery session and single-direction CHAP during normal session

Table 17 (page 104) lists the settings you use to enable bidirectional CHAP during a discovery session and single-direction CHAP during a normal session.

Table 17 CHAP bidirectional settings

MPX200 secret settings		Microsoft initiator secret settings	
Source	Setting (example)	Action	Setting (example)
iSCSI Port	hpstorageworks	General Tab Secret	hpstorageworks
Discovered iSCSI Initiator	CHAPsecret01	Add Target Portal	CHAPsecret0
iSCSI Presented Target	N/A	Log on to Target	CHAPsecret01

NOTE: These are examples of secret settings. Configure CHAP using settings that apply to your network environment.

1. Enable CHAP for the MPX200 discovered iSCSI initiator entry (CHAP can be enabled via CLI only).
 - a. If the iSCSI initiator is not listed when you execute the `set chap` command, do one of the following:
 - From HP P6000 Command View, select **Hosts**, and then select the **Add Host** tab. Enter the IQN name string.
 - From the CLI, enter the `initiator add` command and add the iSCSI initiator that performs the discovery.
 - b. If the iSCSI initiator is listed under the `set chap` command, then enable CHAP secret (for example: CHAPsecret01).
 - Select the index of the iSCSI initiator.
 - To Enable CHAP, select 0, and then enter the CHAP secret.
2. Enable CHAP for the MPX200 iSCSI port.
 - a. To enable CHAP for the MPX200 iSCSI port using HP Command View:
 - Select the appropriate iSCSI Controller, then select the **IP Ports** tab, and then select the appropriate IP Port.
 - Under Security, select **Enabled in CHAP Status**, and then enter the CHAP Secret (for example, `hpstorageworks`).
 - Select the **Save Changes** tab to save the changes.
 - b. To enable CHAP for the MPX200 iSCSI port using the MPX200 CLI:
 - Enter the `set chap` command.
 - Select the appropriate Portal iqn name index that the initiator logs in to.
 - Select 0 to enable CHAP.
 - Enter a CHAP secret. For example: `hpstorageworks`.

3. Enable CHAP for the Microsoft iSCSI initiator.
 - a. Select the **General** tab.
 - b. Click **Secret** in the middle of the screen.
 - c. Click **Reset**.
 - d. Enter the MPX200 iSCSI Presented Target CHAP secret (for example: `hpstorageworks`).
 - e. Click **OK**.
 - f. Click **Discovery**.
 - To discover iSCSI target portals manually:
 - a. Click **Add** under **Target Portals**.
 - b. Enter the IP address of the iSCSI port of the MPX200.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example, `CHAPsecret01`).
 - f. Select the **Mutual Authentication** check box.
 - g. Click **OK**.
 - h. Click **OK**.

The initiator completes Target discovery
 - Using iSNS for Target discovery:
 - a. Click **Add** under **iSNS Servers**.
 - b. Enter the IP address of the iSNS server.
 - c. Click **OK**.
 - g. Click **Targets**.
 - h. Select the appropriate target for login.
 - i. Click **Log On**.
 - j. Click **Advanced**.
 - k. Select the **CHAP Login Information** check box.
 - l. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example, `CHAPsecret01`).
 - m. Select the **Mutual Authentication** check box.
 - n. Click **OK**.
 - o. Click **OK** again and the initiator completes normal login.

Enabling bidirectional CHAP during discovery session and bidirectional CHAP during normal session

Table 18 (page 105) lists the settings you use to enable bidirectional CHAP during a discovery session and bidirectional CHAP during a normal session.

Table 18 CHAP bidirectional settings

MPX200 secret settings		Microsoft initiator secret settings	
Source	Setting (example)	Action	Setting (example)
iSCSI Port	<code>hpstorageworks</code>	General Tab Secret	<code>hpstorageworks</code>
Discovered iSCSI initiator	<code>CHAPsecret01</code>	Add Target Portal	<code>CHAPsecret0</code>

Table 18 CHAP bidirectional settings (continued)

iSCSI Presented Target	hpstorageworks	Log on to Target	CHAPsecret01
NOTE: These are examples of secret settings. Configure CHAP using settings that apply to your network environment.			

1. Enable CHAP for the MPX200 discovered iSCSI initiator entry (CHAP can be enabled via CLI only):
 - a. If the iSCSI initiator is not listed when you execute the `set chap` command, do one of the following:
 - From HP P6000 Command View, select **Hosts** and then select the **Add Host** tab. Enter the IQN name string.
 - From the CLI, enter the `initiator add` command and add the iSCSI initiator that performs the discovery.
 - b. If the iSCSI initiator is listed under the `set chap` command, enable CHAP secret (for example: CHAPsecret01).
 - a. Select the index of the iSCSI initiator.
 - b. To Enable CHAP, select 0, then enter the CHAP secret.
2. Enable CHAP for the MPX200 iSCSI port:
 - a. To enable CHAP for the MPX200 iSCSI port using HP Command View:
 - Select the appropriate iSCSI Controller, then select the **IP Ports** tab, and then select the appropriate IP Port.
 - Under **Security**, select **Enabled in CHAP Status**, and then enter the CHAP Secret (for example: hpstorageworks).
 - Select the **Save Changes** tab to save the changes.
 - b. Enable CHAP for the MPX200 iSCSI port using the MPX200 CLI:
 - Enter the `set chap` command.
 - Select the appropriate Portal iqn name index that the initiator logs in to.
 - Select 0 to enable CHAP.
 - Enter a CHAP secret (for example: hpstorageworks).
3. Enable CHAP for the MPX200 iSCSI presented target using the CLI:
 - a. Enter the `set CHAP` command.
 - b. Select the Presented Target the initiator logs in to.
 - c. Enable CHAP and enter a CHAP secret (for example, hpstorageworks).

4. Enable CHAP for the Microsoft iSCSI initiator.
 - a. Select the **General** tab.
 - b. Click **Secret** in the middle of the screen.
 - c. Click **Reset**.
 - d. Enter the MPX200 iSCSI Presented Target CHAP secret (for example: `hpstorageworks`).
 - e. Click **OK**.
 - f. Click **Discovery**.
 - For manually discovering iSCSI target portals:
 - a. Click **Add** under **Target Portals**.
 - b. Enter the IP address of the iSCSI port of the MPX200.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example: `CHAPsecret01`).
 - f. Select the **Mutual Authentication** check box.
 - g. Click **OK**.
 - h. Click **OK** again and the initiator completes target discovery.
 - Using iSNS for target discovery:
 - a. Click **Add** under **iSNS Servers**.
 - b. Enter the IP address of the iSNS server.
 - c. Click **OK**.
 - g. Click **Targets**.
 - h. Select the appropriate target for login.
 - i. Click **Log On**.
 - j. Click **Advanced**.
 - k. Select the **CHAP Login Information** check box.
 - l. Enter the CHAP secret for the MPX200 discovered iSCSI initiator in the **Target Secret** box (for example: `CHAPsecret01`).
 - m. Select the **Mutual Authentication** check box.
 - n. Click **OK**.
 - o. Click **OK** again and the initiator completes normal login.

8 MPX200 FCIP

MPX200 FCIP product description

The HP MPX200 Multifunction Router with an FCIP license provides FC SAN extension over an IP network. Used in conjunction with 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class, P6000/EVA, and XP storage system families and Remote Copy and HP Continuous Access software, the MPX200 enables long-distance remote replication for disaster tolerance. A base FCIP configuration consists of a minimum of two MPX200 blades, one for the local site and one for the remote site.

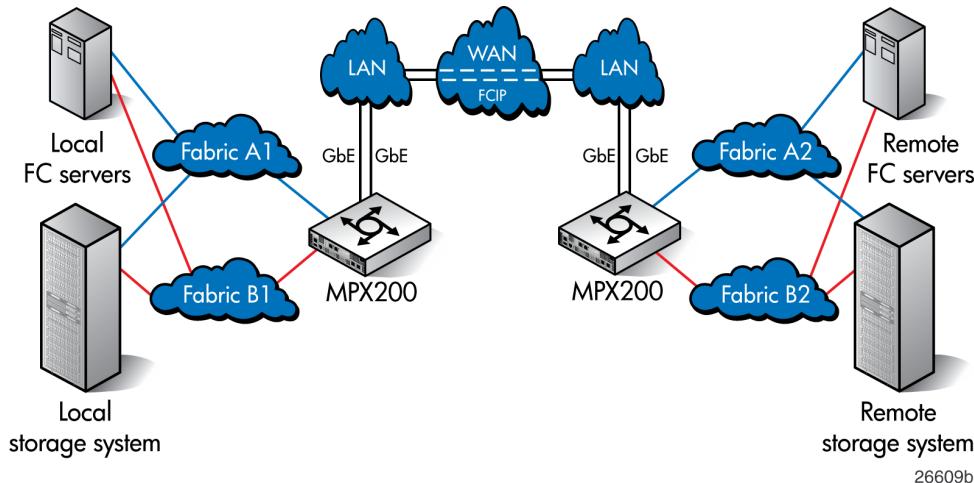
The MPX200 FCIP feature can be configured as a standalone function or for use simultaneously with iSCSI. A license is required to enable the FCIP feature. All licenses are half-chassis based, allowing FCIP to be configured on one or both bays (slots) in a dual-blade chassis configuration. The following licenses are available for FCIP:

- HP Storage Works MPX200 Half Chassis FCIP License — Includes the license to enable FCIP functionality in one out of two bays (slots) in an MPX200 Chassis.
- HP Storage Works MPX200 Full Chassis FCIP License — Includes the license to enable FCIP functionality for both bays (slots) in an MPX200 Chassis.

NOTE: If you install a single blade and a half-chassis license initially, and then install a second blade, a second half-chassis license is required.

A base configuration can be either a single HP MPX200 Multifunction Router 1-GbE Base Chassis (MPX200), or an HP MPX200 Multifunction Router 10-1 GbE Base Chassis (MPX200). Note that FCIP is currently supported only on MPX200 1 GbE ports per site, which is required. See [Figure 89 \(page 108\)](#).

Figure 89 MPX200 basic FCIP configuration

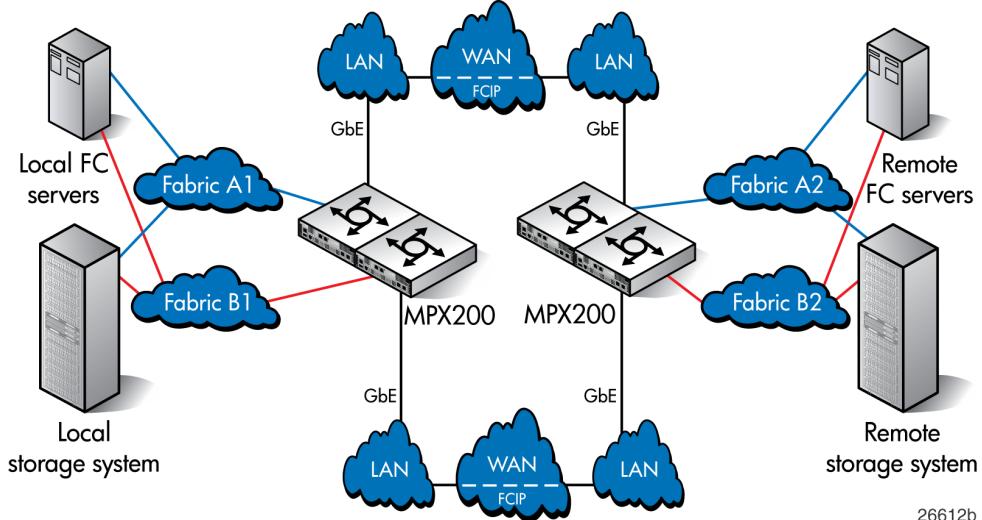


Redundant FCIP network structure example

In a high-availability FCIP configuration, pairs of MPX200 routers and two independent IP networks provide full redundancy. Loss of connectivity through one of the IP networks does not result in a loss of connectivity between the fabrics.

The redundant configuration can be either a single HP MPX200 Multifunction Router 1-GbE Base Chassis with an HP MPX200 Router 1-GbE Upgrade Blade, or an HP MPX200 Multifunction Router 10-1 GbE Base Chassis with an HP MPX200 Router 10-1 GbE Upgrade Blade. Note that FCIP is currently supported only on MPX200 1 GbE ports. See [Figure 90 \(page 109\)](#).

Figure 90 MPX200 high-availability configuration with fully-redundant long-distance links



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Using FCIP to encapsulate FC packets

With FCIP, gateways transport FC frames over an IP network. From the perspective of the local and remote fabrics, the FC devices accessed through the gateways appear to be part of one unified fabric. This is possible because FC traffic is carried over the IP network in such a way that the FC fabric and all FC devices on the fabric are unaware of the presence of the IP network. Once configured, FCIP instances on each gateway become active and establish their connectivity through the IP network. The FC devices in the local fabric access the FC devices in the remote fabric using FC frames. The FC frames are encapsulated in IP packets by the local gateway and then transmitted to the remote gateway. The remote gateway strips the IP packet data and passes only the FC frames to the remote FC devices. The gateways deployed for FCIP are configured to use TCP, which uses standard TCP flow control and error recovery algorithms.

FCIP Impact on existing iSCSI configurations

This guide includes samples of FCIP and iSCSI configurations to illustrate some of the many possible configurations available. Despite the number of permutations, there are really only two basic FCIP configurations: a *dedicated FCIP blade* and a *shared iSCSI/FCIP blade*.

A dedicated MPX200 blade running only FCIP does not have any impact on a dedicated MPX200 blade running iSCSI. There is, however, an impact and possibly changes required for existing MPX200 iSCSI configurations when FCIP is added to the same blade. Also consider this possibility when planning a new iSCSI/FCIP mixed blade configuration.

Configuring an FCIP route and specifying an FC and GE port pair take precedence over any previous configuration for the port pair (FC/GE). This means that for an existing or new iSCSI configuration, once an FCIP Route is configured, one FC port and one GE port are no longer available for iSCSI or DM use.

For existing iSCSI configurations, there are two configuration cases to consider: one with a single FC fabric (see [Figure 91 \(page 110\)](#)) connected to an MPX200 blade and one with dual FC fabrics (see [Figure 92 \(page 110\)](#)) connected to an MPX200 blade. In the single FC fabric case (see [Figure 91 \(page 110\)](#)), the impact is minimal and can be resolved by rezoning any targets that were zoned only with the FCIP FC port to the remaining iSCSI FC port of that blade. Once the targets are rezoned, the impact to iSCSI is the loss of one 1 GbE port.

Figure 91 FCIP impact on existing iSCSI configurations – single fabric per blade

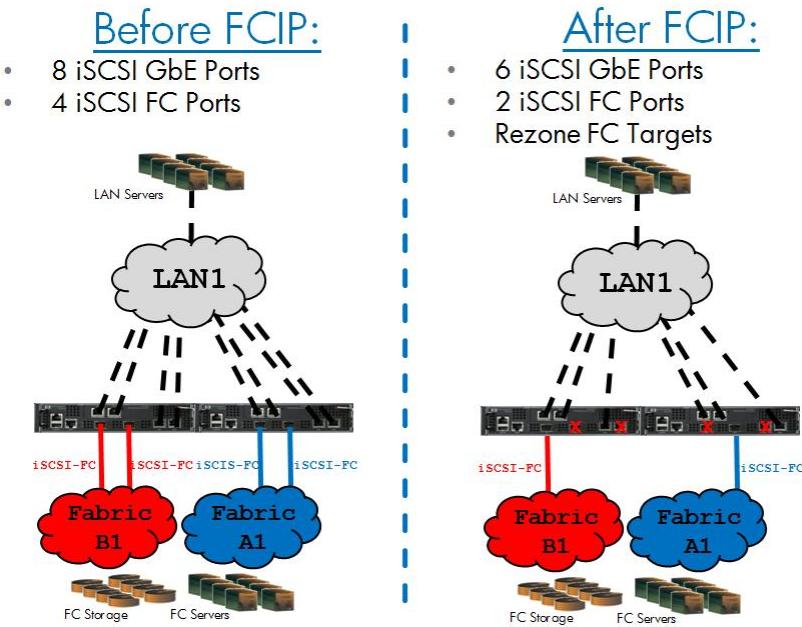
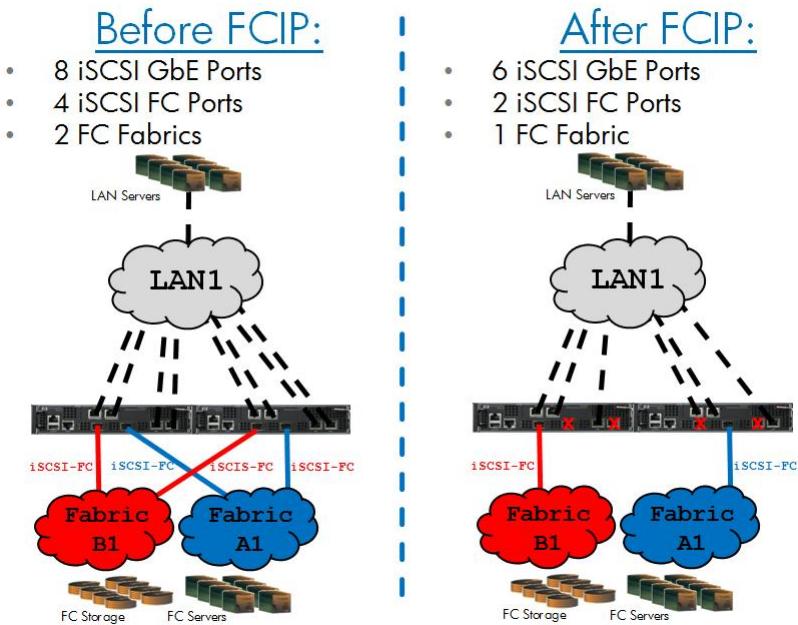


Figure 92 FCIP impact on existing iSCSI configurations — dual fabrics per blade



In the dual FC fabric case, the impact is higher because after adding an FCIP Route there is only one remaining FC port available for iSCSI. Therefore, only the targets from one fabric or the other will be available to iSCSI initiators connected to that MPX200 blade; access to targets on the other fabric are through another MPX200 blade.

FCIP and iSCSI performance

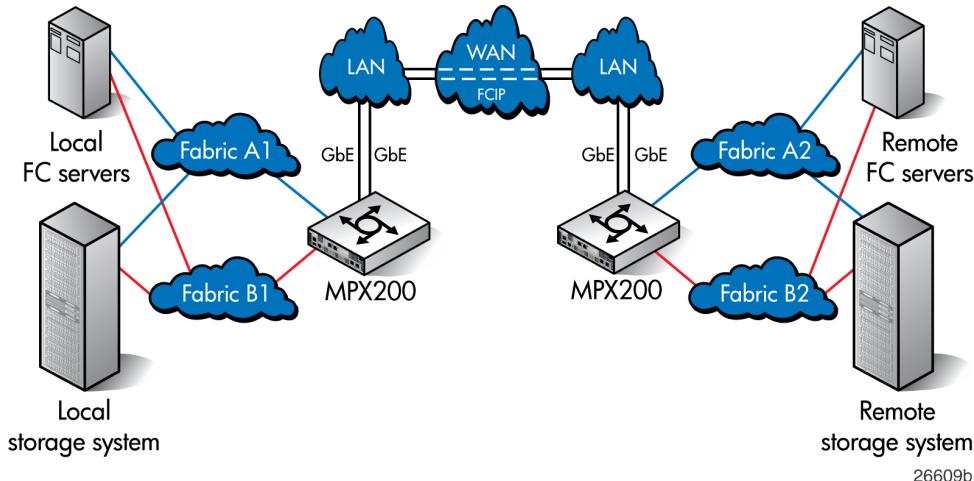
In most use cases, mixing iSCSI and FCIP on the same blade provides adequate performance. However, high availability/performance goals may dictate a dedicated MPX200 for each function or protocol. For example, if your performance needs are for more than 8 Gb/s of FC access for iSCSI alone, configuring FCIP on the same blade would limit FC access to only 8 Gb/s and would not meet the performance requirements for that situation.

MPX200 iSCSI/FCIP configurations

The MPX200 router supports the following configurations:

- [Figure 93 \(page 111\)](#) MPX200 basic FCIP configuration with one or two long-distance links
- [Figure 94 \(page 112\)](#) MPX200 FCIP with B-series Integrated Routing
- [Figure 95 \(page 112\)](#) MPX200 FCIP with C-series IVR
- [Figure 96 \(page 112\)](#) MPX200 high-availability configuration with one or two long-distance links
- [Figure 97 \(page 113\)](#) MPX200 high-availability configuration with fully-redundant long-distance links
- [Figure 98 \(page 113\)](#) MPX200 configuration with remote IP distance gateway (mpx110)
- [Figure 99 \(page 113\)](#) MPX200 highly-redundant configuration with one or two long-distance links
- [Figure 100 \(page 114\)](#) MPX200 highly redundant pairs of gateways with fully-redundant long-distance links
- [Figure 101 \(page 114\)](#) MPX200 simultaneous iSCSI and FCIP with remote dedicated FCIP blade
- [Figure 102 \(page 115\)](#) MPX200 simultaneous iSCSI and FCIP, both local and remote
- [Figure 103 \(page 115\)](#) MPX200 iSCSI and FCIP dedicated blades, both local and remote
- [Figure 104 \(page 116\)](#) HP Continuous Access 3-site configuration with four MPX200 routers
- [Figure 105 \(page 117\)](#) HP Continuous Access 3-site configuration with six MPX200 routers
- [Figure 106 \(page 118\)](#) HP Continuous Access 3-site configuration with eight MPX200 routers
- [Figure 107 \(page 119\)](#) HP Continuous Access 3-site configuration with six MPX200 router full peer-to-peer connectivity

Figure 93 MPX200 basic FCIP configuration with one or two long-distance links



[Figure 94 \(page 112\)](#) shows a configuration using MPX200 with FCIP and B-series switches with Integrated Routing. This provides fabric isolation between the local and remote fabrics, allowing device access without merging the fabrics. This can be implemented in all supported MPX200 FCIP configurations using B-series Fibre Channel switches with Integrated Routing or B-series routers configured for Fibre Channel routing.

Figure 94 MPX200 FCIP with B-series Integrated Routing

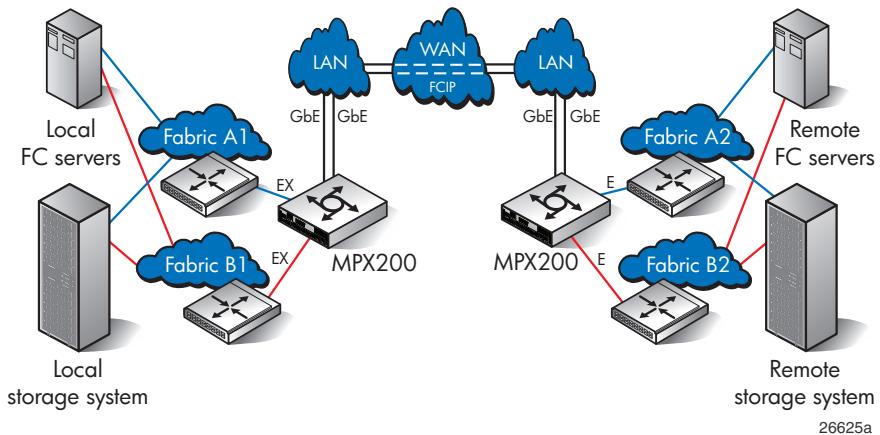


Figure 95 (page 112) shows a configuration using the MPX200 with FCIP and C-series switches with IVR. This provides fabric isolation between the local and remote fabrics, allowing device access without merging the fabrics. This can be implemented in all supported MPX200 FCIP configurations using C-series Fibre Channel switches with IVR.

Figure 95 MPX200 FCIP with C-series IVR

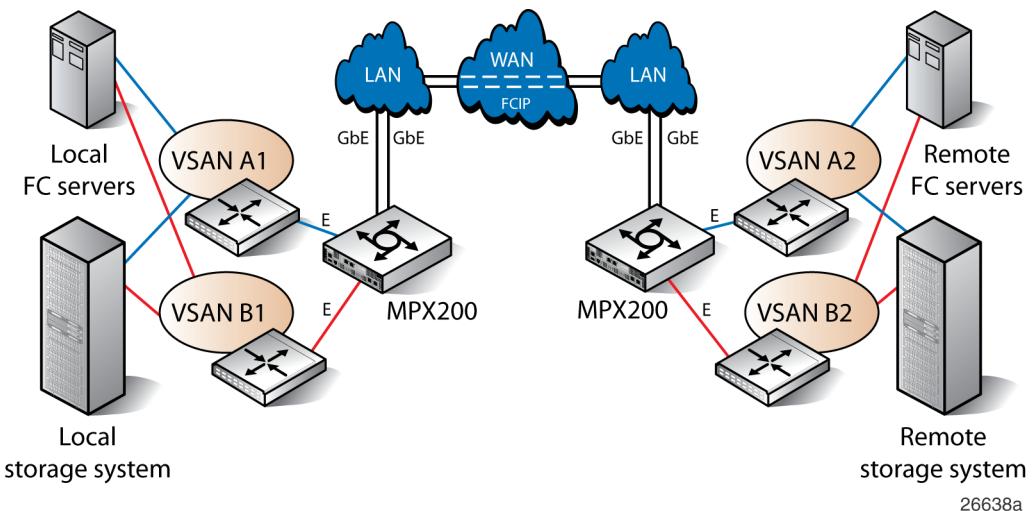


Figure 96 MPX200 high-availability configuration with one or two long-distance links

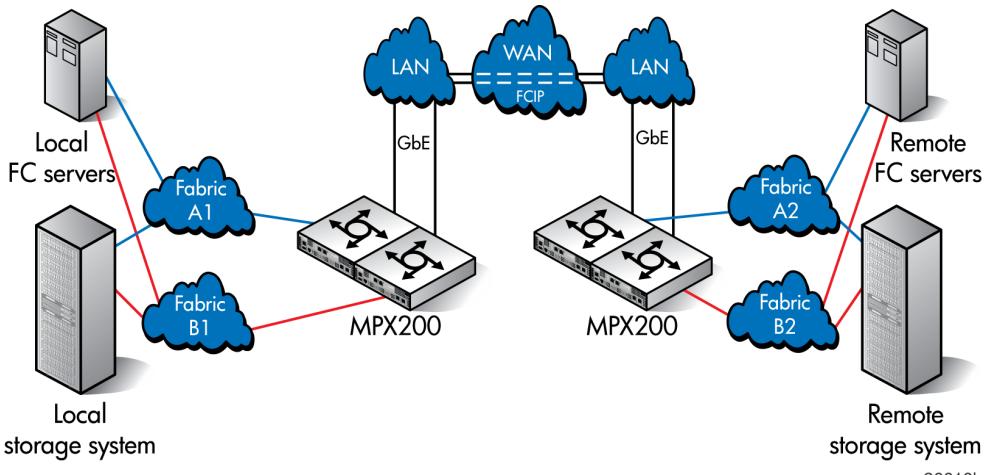


Figure 97 MPX200 high-availability configuration with fully-redundant long-distance links

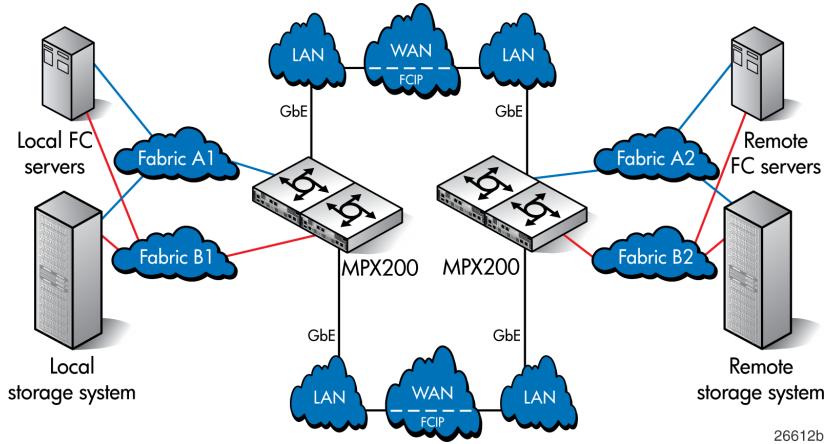


Figure 98 MPX200 configuration with remote IP Distance gateway (mpx110)

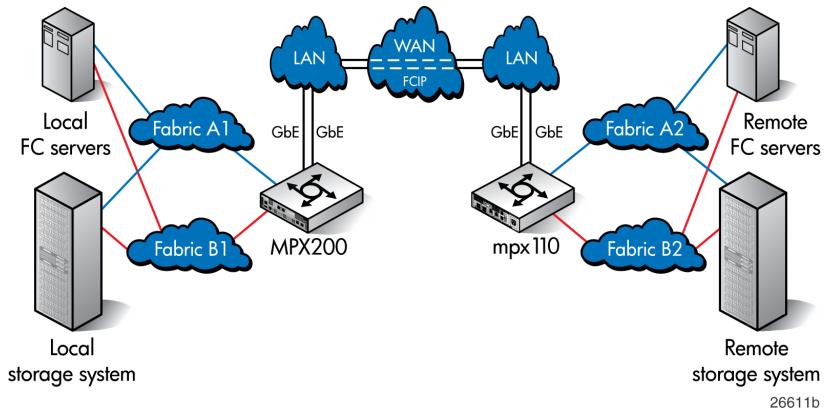


Figure 99 MPX200 highly-redundant configuration with one or two long-distance links

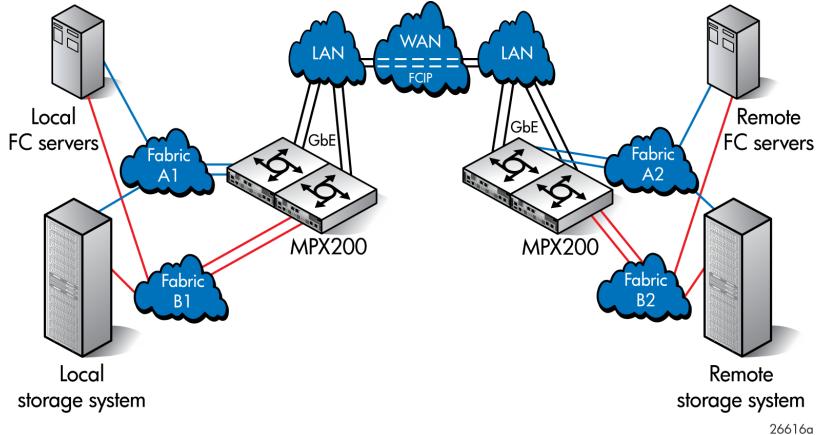


Figure 100 MPX200 highly redundant pairs of gateways with fully-redundant long-distance links

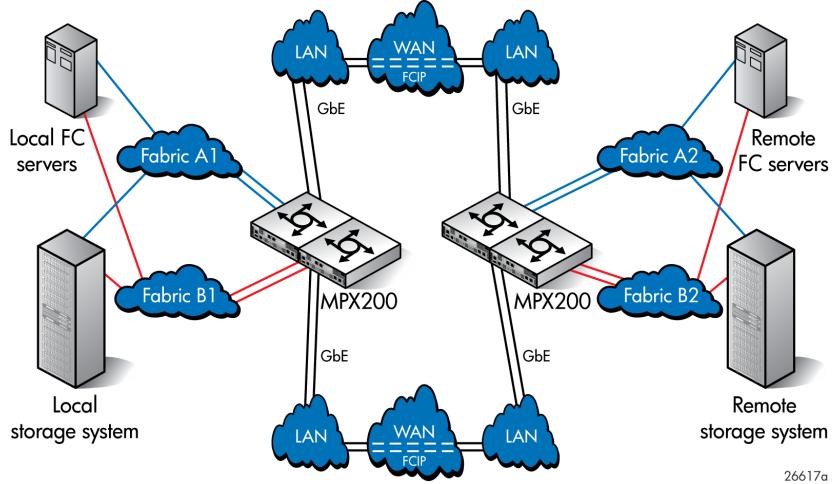


Figure 101 MPX200 simultaneous iSCSI and FCIP with remote dedicated FCIP blade

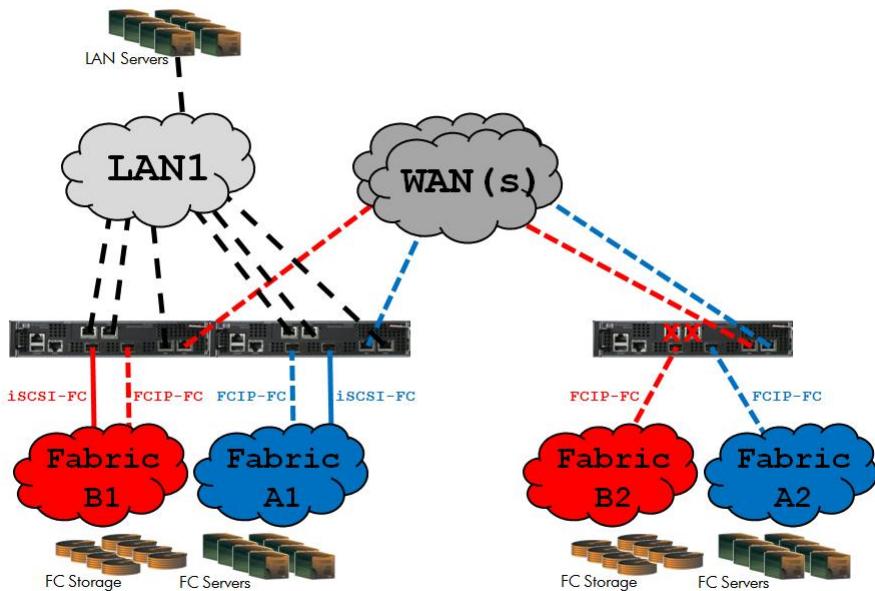


Figure 102 MPX200 simultaneous iSCSI and FCIP, both local and remote

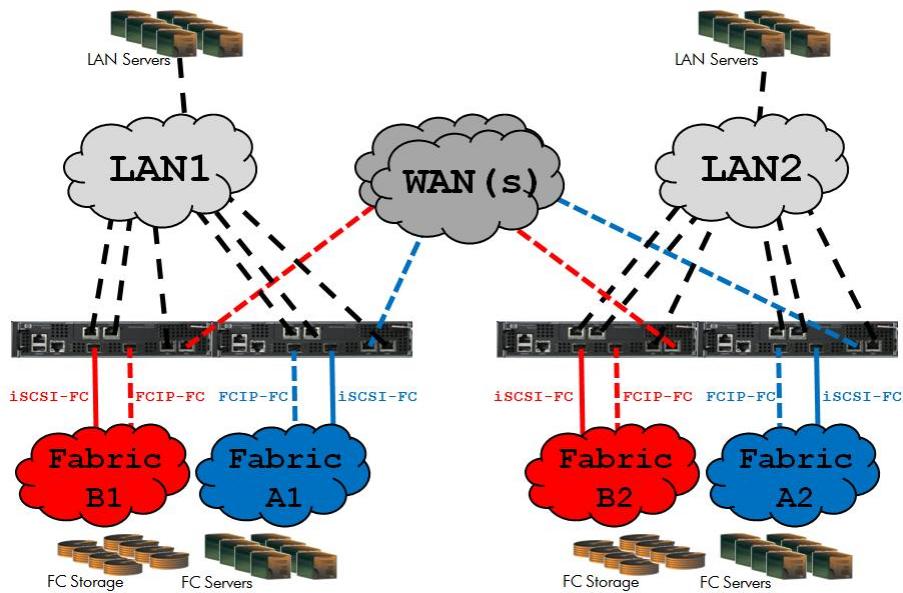
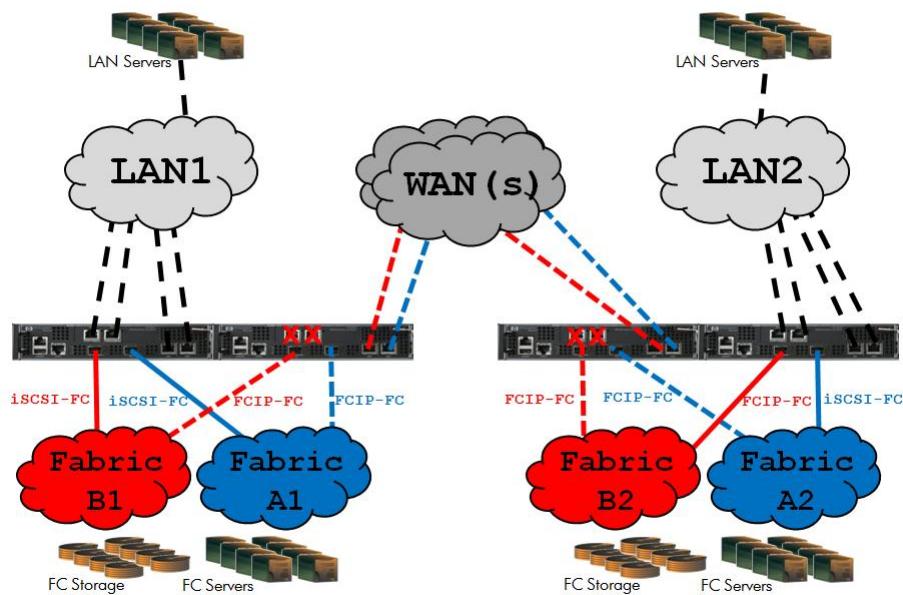


Figure 103 MPX200 iSCSI and FCIP dedicated blades, both local and remote



HP Continuous Access 3-site configurations

This section describes the following HP Continuous Access 3-site configurations:

- HP Continuous Access 3-site configuration with four MPX200 routers
- HP Continuous Access 3-site configuration with six MPX200 routers
- HP Continuous Access 3-site configuration with eight MPX200 routers
- 3-site configuration with six gateways and full inter-site connectivity

The first three configurations provide a fan-in or fan-out relationship between the sites. The fourth configuration provides a peer-to-peer relationship between all sites.

Figure 104 (page 116) shows connectivity for three sites using four MPX200 routers, which implement the minimum-level and lowest-cost connectivity for a 3-site configuration. Figure 105 (page 117)

shows additional connectivity and redundancy using six MPX200 routers. [Figure 106 \(page 118\)](#) shows the highest level of 3-site connectivity using eight MPX200 routers.

[Figure 107 \(page 119\)](#) is similar to [Figure 105 \(page 117\)](#), with additional connectivity to allow for replication between Site 2 and Site 3.

The following configuration rules apply to [Figure 104 \(page 116\)](#) through [Figure 106 \(page 118\)](#) (fan-in/fan-out relationships):

- For Site 1, Site 2 or Site 3 can function as the remote site.
- For Site 2 or Site 3, Site 1 can function as the remote site.
- Replication between Site 2 and Site 3 is not supported.

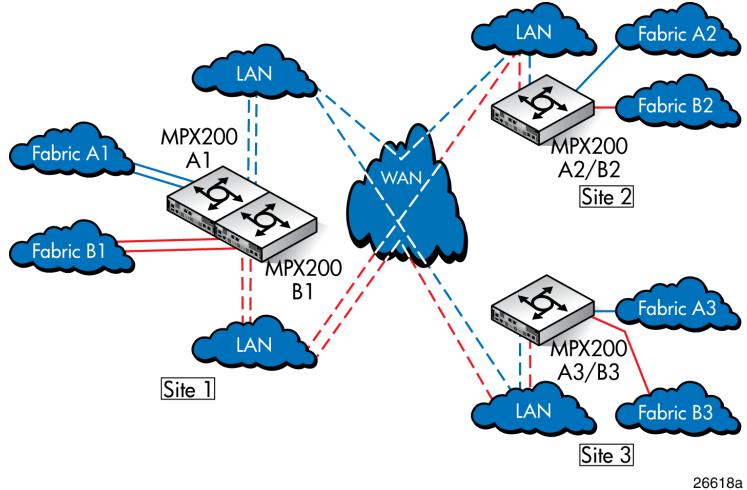
The following configuration rules apply to [Figure 107 \(page 119\)](#) (peer-to-peer relationship):

- For Site 1, Site 2 or Site 3 can function as the remote site.
- For Site 2, Site 1 or Site 3 can function as the remote site.
- For Site 3, Site 1 or Site 2 can function as the remote site.

3-site configuration with four MPX200 routers

The configuration in [Figure 104 \(page 116\)](#) provides long-distance link redundancy between all three sites.

Figure 104 HP Continuous Access 3-site configuration with four MPX200 routers

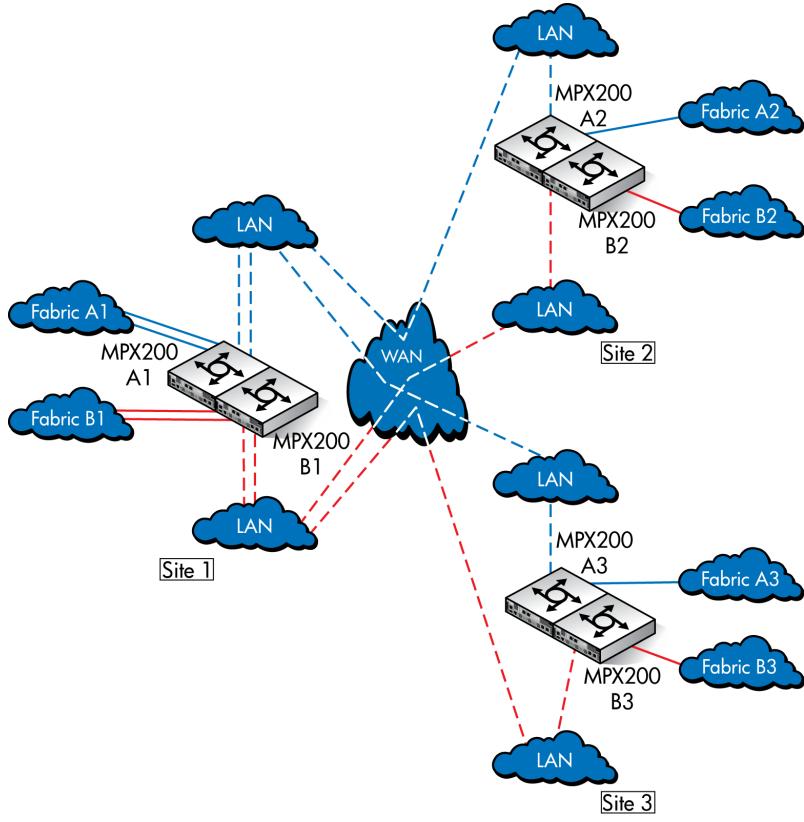


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3-site configuration with six MPX200 routers

The configuration in [Figure 105 \(page 117\)](#) provides the same long-distance link redundancy as the configuration in [Figure 104 \(page 116\)](#), with the addition of redundant MPX200 routers at sites 2 and 3.

Figure 105 HP Continuous Access 3-site configuration with six MPX200 routers

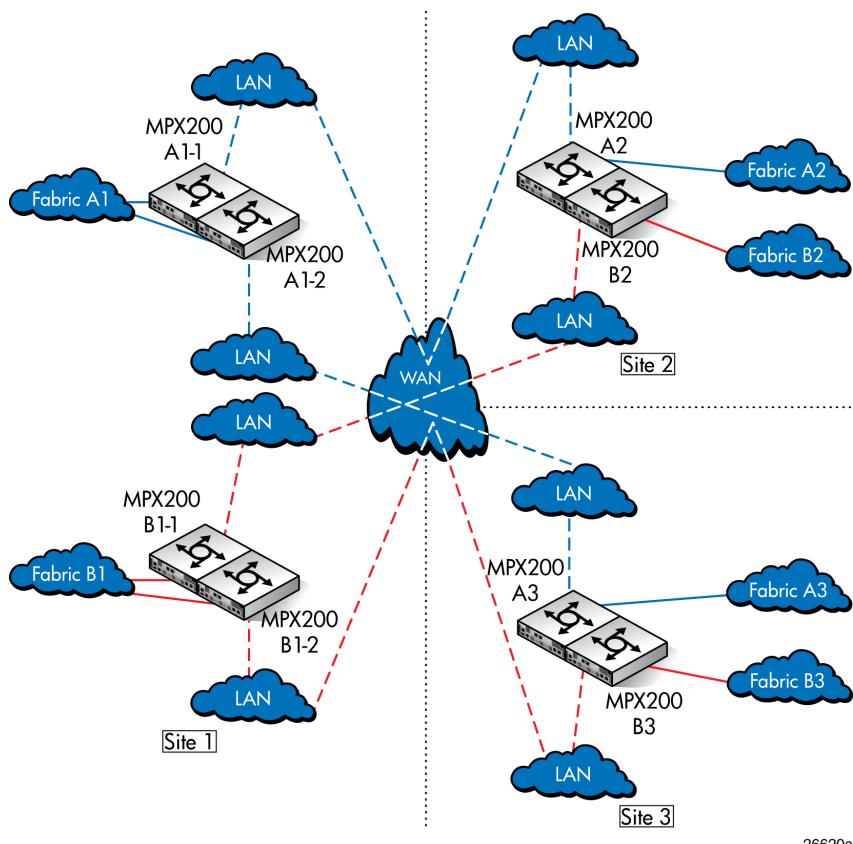


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3-site configuration with eight MPX200 routers

The configuration in [Figure 106 \(page 118\)](#) provides the highest 3-site redundancy, with a dedicated MPX200 pair for all long-distance links to all three sites.

Figure 106 HP Continuous Access 3-site configuration with eight MPX200 routers

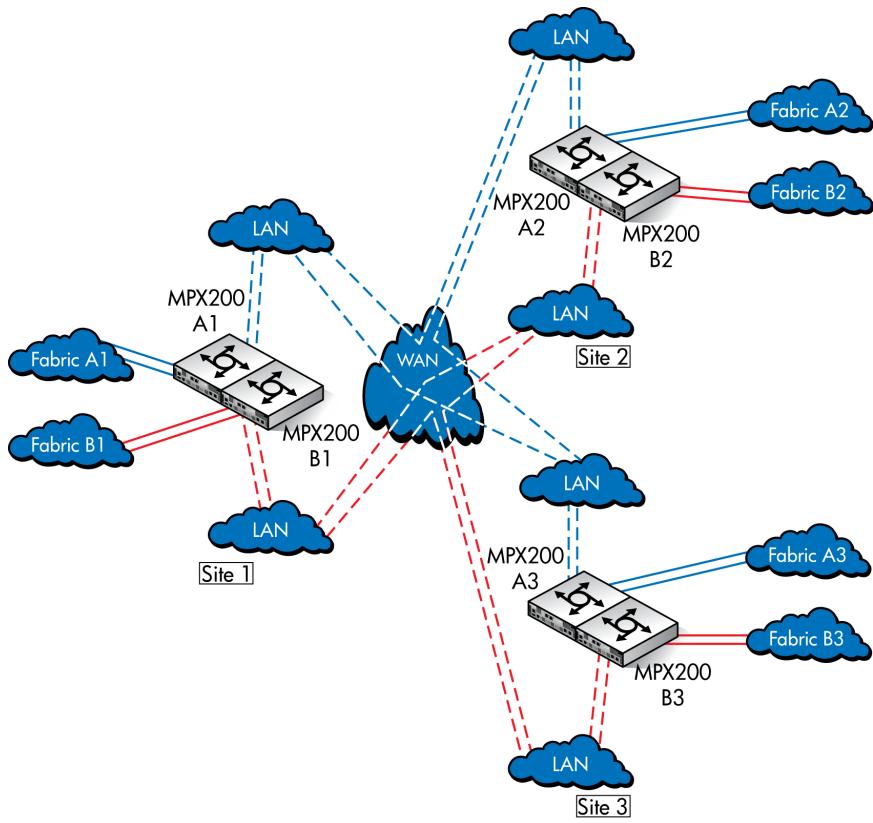


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3-site configuration with six MPX200 routers and full inter-site connectivity

Figure 107 (page 119) provides long-distance link redundancy and full connectivity between all three sites.

Figure 107 HP Continuous Access 3-site configuration with six MPX200 router full peer-to-peer connectivity



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FCIP configuration rules and guidelines

This section defines the FCIP configuration rules for using the MPX200 Multifunction Router.

General FCIP configuration rules

The following general configuration rules apply:

- All MPX200 FCIP configurations require a minimum of two gateways. These can be two MPX200s or one MPX200 and one IP Distance Gateway (mpx110), one local and one remote, connected through an IP network. HP does not support FCIP connectivity between other gateway models.
- FCIP is supported on GbE ports only. For the MPX200 1 GbE blade, ports GE1, GE2, GE3, and GE4 are GbE. For the MPX200 10 GbE blade, ports GE1 and GE2 are GbE.
- The MPX200 Multifunction Router is supported for FCIP extension with HP 3PAR Remote Copy, HP Continuous Access and XP Continuous Access (see ["Storage system rules and guidelines" \(page 120\)](#)).

NOTE: For current support, see SPOCK at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

Operating system and multipath support

The MPX200 Multifunction Router is supported using FCIP with all operating systems and multipath software supported by HP for Continuous Access EVA and XP Continuous Access. For more information, see the *HP SAN Design Reference Guide*, available at <http://www.hp.com/go/SDGManuals>.

Storage system rules and guidelines

- The MPX200 Multifunction Router configured for FCIP is supported for use with the following HP Continuous Access storage systems:
 - EVA4400/4400 with embedded switch
 - EVA4000/4100/6000/6100/8000/8100
 - EVA6400/8400
 - P6300/P6350/P6500/P6550
 - EVA3000/5000
 - P9500
 - 3PAR StoreServ 10000/7000
 - 3PAR T-Class/F-Class
 - XP24000/20000
 - XP12000/10000
- The MPX200 Multifunction Router is supported for use in all HP-supported HP Continuous Access configurations, including the standard two-fabric, five-fabric, and six-fabric configurations.
- HP Continuous Access supports RCS and non-RCS LUNs with FCIP extension.
- HP MPX200 Multifunction Router supports the minimum IP bandwidth/maximum DR groups.
- The minimum bandwidth required for XP Continuous Access is 16 Mb/s per path.
- The MPX200 Multifunction Router is supported with current P6000 EVA storage software applications such as HP Continuous Access, P6000 Command View, Business Copy, SSSU, and Replication Solutions Manager.

Table 19 (page 120) specifies the minimum IP bandwidth and maximum DR groups for EVA XCS and VCS.

Table 19 Minimum IP bandwidth and maximum EVA DR groups

Gateway pair	Minimum IP bandwidth and maximum DR groups ¹	
	Dual fabric latency (0 and 100 ms one-way)	Single or shared IP link latency (0 to 100 ms one-way)
MPX200 Multifunction Router (MPX200)	Minimum: At least 2 Mb/s for 1 DR group Recommended: At least 5 Mb/s for 1 to 5 DR groups	Minimum: At least 4 Mb/s for 1 DR group Recommended: At least 10 Mb/s for 1 to 5 DR groups

¹ 1 Gb/s IP bandwidth can have up to 128 DR groups with VCS 4.x, and up to 256 DR groups with XCS.

Fibre Channel switch and firmware support

The MPX200 is compatible with the following Fibre Channel switches:

- B-series 8 Gb/s, 4 Gb/s, and 2 Gb/s Fibre Channel switches
- C-series 8 Gb/s, 4 Gb/s, and 2 Gb/s Fibre Channel switches
- H-series 8 Gb/s Fibre Channel switches

NOTE: For current support, see SPOCK at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

FC switch requirements

For additional B-series, C-series, and H-series FC switches, local and remote MPX200 Multifunction Router pairs must be connected to the same Fibre Channel switch product line series.

NOTE: The MPX200 Fibre Channel ports operate at 2, 4, and 8 Gb/s.

IP network requirements

HP requires that the following standards be met for the IP network:

- Supported network protocols are TCP/IP IPv4 and IPv6 Ethernet 1,000 Mb/s. For minimum IP bandwidth requirements, see ["Storage system rules and guidelines" \(page 120\)](#).
- For MPX200 IP data—Local and remote pairs are supported for up to 100 ms of IP network delay one-way, or 200 ms round-trip for HP Continuous Access. HP requires dedicated IP bandwidth (see [Table 20 \(page 121\)](#)).
- For MPX200 IP management—LAN and WAN are supported.
- For XP Continuous Access network requirements, see the SAN Extension chapter in the *HP StorageWorks SAN Design Reference Guide*.

Table 20 Network requirements for the MPX200 with XCS and VCS

Specification	Description
Bandwidth ¹	Must be dedicated to the HP Continuous Access storage replication Bandwidth function. There is no support for dynamic pacing of the gateway.
Maximum number of DR groups	See Table 19 (page 120) for minimum supported bandwidth based on the average maximum number of DR groups packet-loss ratio and one-way intersite latencies.
MTU of the IP network	1,500 bytes
Maximum latency ¹	EVA: 100 ms one-way or 200 ms round-trip
Average packet-loss ratio ²	Low-loss network: 0.0012% average over 24 hours High-loss network: 0.2% average over 24 hours; must not exceed 0.5% for more than 5 minutes in a 2-hour window
Latency jitter ³	Must not exceed 10 ms over 24 hours.

¹ Pre-existing restriction

² A high packet-loss ratio indicates the need to retransmit data across the intersite link. Each retransmission delays transmissions queued behind the current packet, thus increasing the time to complete pending transactions.

³ Latency jitter is the difference between the minimum and maximum values, and indicates how stable or predictable the network delay. The greater the jitter, the greater the variance in the delay, which lowers the performance predictability.

IP performance tuning

The MPX200 supports Fibre Channel service at transmission rates of 2 Gb/s, 4 Gb/s or 8 Gb/s with a maximum frame size of 2,148 bytes. It supports Ethernet service at transmission rates of 1,000 or 100 Mb/s with an MTU size between 1,000 and 9,000 bytes (jumbo frames). Related performance characteristics include the following:

- Distance
- Bandwidth per route
- Latency
- MTU/Jumbo frames
- Compression

- TCP window size/ scaling performance tuning
- Modifying the window size and scaling factor
- TCP window size and scaling factor recommendations

Distance

Consider the physical distance between the MPX200 Multifunction Routers. This is usually measured in RTT. The RTT can be anywhere from less than 1 millisecond to as great as 200 milliseconds.

Bandwidth per route

Bandwidth is a measure of the volume of data that can be transmitted at a given transmission rate. WAN data rates typically range from 1.5 Mb/s (T1) to 1 Gb/s. The proper MPX200 bandwidth setting is determined based on the bandwidth that is available for each FCIP route, irrespective of the total bandwidth and physical speed of the link.

To determine the proper MPX200 bandwidth setting, start with the total bandwidth of the WAN link. Adjust this number based on the guaranteed allocated FCIP bandwidth and further adjust this number if the number of FCIP routes configured is greater than one. For example, if the WAN link is 45 Mb/s and 15 Mb/s is allocated to network traffic, the remaining 30 Mb/s is available for FCIP. If in this example the MPX200 is configured for two routes, based on the 30 Mb/s total bandwidth available for FCIP, you would set the MPX200 bandwidth parameter to 15, the available bandwidth for each FCIP route.

HP Continuous Access replication solution requires dedicated bandwidth for the intersite link. If other applications share the intersite link, some method of QOS must be used to ensure that the replication application has uncontested access to the allocated bandwidth.

NOTE: Setting the bandwidth per route setting higher than the actual bandwidth available for each route results in a decrease in performance; the optimal setting matches the bandwidth per route setting to the actual bandwidth available for each route.

Latency

Latency is the amount of time a packet takes to traverse the network from source to destination.

MTU/Jumbo frames

- For MTU size there are 3 choices, **normal** (1500 bytes), **Jumbo** (9000 bytes) and **other**, where you are then prompted for a value between 1000 and 9000.
- Typically MTU should be set to the default of 1500; rarely do WAN networks support MTU sizes greater than 1500. An MTU setting that is too high can result in a high number of dropped packets and retransmissions, significantly impacting performance. An MTU that is too low (less than 1200) causes a single Fibre Channel frame to be spread across more than two Ethernet frames, also impacting performance. Using an MTU size of 1500 to 1200 ensures a single Fibre Channel frame (2112 bytes) fits within two Ethernet frames, resulting in optimal performance.
- Encryption products on the WAN link often add some number of additional bytes to each packet, so it may be necessary to decrease the MPX200 MTU size setting to between 1450 and 1200. This reduction accommodates the additional bytes, while maintaining a total MTU size of 1500 or less.
- Jumbo frames can enhance the IP performance of the MPX200. Before enabling Jumbo frames however, you must ensure that the entire network is enabled for Jumbo frames. If any

connections utilized through the network are not set to Jumbo, performance can degrade significantly.

- In addition to support for Jumbo frames, you can select **other** and configure the MTU size between 1000 and 9000 bytes.

NOTE: Jumbo frames are not supported for use with HP Continuous Access.

Compression

The MPX200 integrates a software compression option. This option can be set to disable, enable, or auto. When set to auto, the MPX200 continually assesses data compressibility and automatically enables or disables compression based on data compressibility. The default setting for software compression is disable for new installations. If upgrading from an version of firmware earlier than v3.2.0.1, the existing setting is maintained (either enable or disable).

NOTE: The auto compression mode setting is available with MPX200 firmware version 3.2.0.1 or later.

- Use the disable setting if you know that the data being transferred over FCIP is not compressible.
- Use the disable setting when using a high speed WAN link (622 Mb/s OC-12 up to 1 Gb/s) in a configuration with simultaneous FCIP and iSCSI functions operating on the same MPX200 blade.
- Use the enable setting if you know that the data being transferred over FCIP is compressible.
- Use the auto setting if you are unsure of data compressibility.

NOTE: All mode settings require the proper setting of the MPX200 bandwidth per route parameter, matched to the guaranteed available bandwidth (QoS) of the WAN link, based on the number of routes. See ["Bandwidth per route" \(page 122\)](#). HP does not recommend that you use the auto setting if the available bandwidth per route is inconsistent or unpredictable.

TCP window size/scaling performance tuning

The MPX200 FCIP performance is maximized when properly configured. Knowing the RTT (distance) between MPX200 Multifunction Routers and the WAN dedicated or guaranteed bandwidth allows the gateways to be tuned for optimal performance. See ["Modifying the window size and scaling factor" \(page 123\)](#).

Modifying the window size and scaling factor

The MPX200 window size can be set to a maximum of 32 KB. The scaling factor is used as a multiplier to increase the window size above 32 KB. Modify the window size and scaling factor in the MPX200 Multifunction Router pairs based on the WAN RTT and link speed. To determine the appropriate window size setting and scaling factor, use the pre-populated tables or the following formula. In version 3.4.0.0 and above the TCP Window size and Window scaling factor were combined into a single parameter that reflects the true TCP Window size versus the three parameters used in previous versions.

NOTE: Use the MPX200 CLI command `ping` to determine the RTT and select only the default (~56) packet size for this test. For troubleshooting link issues, always use the maximum packet size.

If the recommended TCP window size and scale factor for a given RTT and WAN link speed is not shown in [Table 22 \(page 124\)](#) through [Table 28 \(page 126\)](#), use the formula: $(RTT \text{ (ms)} \times \text{link rate (Kb/s)} \times (1 \text{ byte}/8 \text{ bits})) = \text{minimum window size (MWS)}$.

Then, convert the MWS to a recommended scale factor by dividing it by the default window size (32,768 bytes). Use [Table 21 \(page 124\)](#) to determine the scale factor.

Table 21 TCP window size scale factors

MWS scale result	Scale factor / TCP Window size
0 to 2	0 / 32KB
2 to 4	1 / 64KB
4 to 8	2 / 128KB
8 to 16	3 / 256KB
16 to 32	4 / 512KB
32 to 64	5 / 1MB
64 to 128	6 / 2MB
128 to 256	7 / 4MB
256 to 512	8 / 8MB
512 or greater	9 / 16MB

TCP window size and scaling factor recommendations

[Table 22 \(page 124\)](#) through [Table 28 \(page 126\)](#) provide TCP window size and scaling factor settings for specific WAN environments. These tables are organized by typical link speed.

NOTE: The TCP window size recommendations listed in [Table 22 \(page 124\)](#) through [Table 28 \(page 126\)](#) are based on low-loss networks (0.0012% average packet-loss ratio over 24 hours). For higher-loss, longer-latency networks, you should reduce the recommended window size and scaling factor by one setting to compensate for the increased number of packet retransmissions.

Table 22 T1/DS-1 1.554 Mb/sec (bandwidth = 1 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	64K	1
100	32K	0
50	32K	0
25	32K	0
20	32K	0
15	32K	0
10	32K	0
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 23 T3/DS-3 45 Mb/sec (bandwidth = 43 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	1M	5
100	512K	4
50	256K	3

Table 23 T3/DS-3 45 Mb/sec (bandwidth = 43 Mb) (continued)

25	128K	2
20	128K	2
15	128K	2
10	64K	1
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 24 OC-1 50 Mb/sec (bandwidth = 50 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	2M	6
100	512K	4
50	256K	3
25	128K	2
20	128K	2
15	128K	2
10	64K	1
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 25 OC-3 150 Mb/sec (bandwidth = 148 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	16M	9
100	4M	7
50	2M	6
25	1M	5
20	1M	5
15	1M	5
10	512K	4
5	256K	3
2.5	128K	2
1 or less	64K	1

Table 26 DS-5 400 Mb/sec (bandwidth = 384 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	4M	7
100	2M	6
50	1M	5

Table 26 DS-5 400 Mb/sec (bandwidth = 384 Mb) (continued)

25	512K	4
20	512K	4
15	256K	3
10	256K	3
5	128K	2
2.5	64K	1
1 or less	32K	0

Table 27 OC-12 621 Mb/sec (bandwidth = 699 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	16M	9
100	8M	8
50	4M	7
25	2M	6
20	1M	5
15	1M	5
10	1M	5
5	512K	4
2.5	256K	3
1 or less	64K	1

Table 28 OC-24 and above 1.244 Gb/sec (bandwidth = 1000 Mb)

Round trip time (RTT) in ms	Window size (bytes)	Scaling factor (2^n)
250	16M	9
100	16M	9
50	8M	8
25	4M	7
20	4M	7
15	2M	6
10	2M	6
5	1M	5
2.5	512K	4
1 or less	128K	2

FCIP link diagnostics

For information on FCIP diagnostics, see “[WANLink diagnostic](#)” (page 145).

Configuring an FCIP route

Step 1. Verify your system requirements

Verify that you have the following for both the local site and the remote site (see “[MPX200 basic FCIP configuration](#)” (page 108)):

- HP MPX200 Multifunction Router 1-GbE Base Chassis or HP MPX200 Multifunction Router 10-1 GbE Base Chassis. Note that FCIP is currently supported only on MPX200 1 GbE ports.
- HP MPX200 Half Chassis FCIP License
- Continuous Access EVA
- EVA3000/5000, EVA4x00/6x00/8x00, P63x0/P65x0, XP24000/20000/12000/10000, or P9500 storage systems
- 3PAR StoreServ 10000/7000, 3PAR T-Class/F-Class
- FC fabrics consisting of B-series C-series, or H-series switches
- Cat 5e network cable, three per site (mgmt, (2) FCIP)
- Optical SFP transceiver and FC cable, two per site
- MPX200 serial console cable adapter, Cat 5e network cable

Additional equipment for the local site and remote site (see “[MPX200 high-availability configuration with one or two long-distance links](#)” (page 112) and “[MPX200 configuration with remote IP Distance gateway \(mpx110\)](#)” (page 113)) is as follows:

- HP MPX200 Multifunction Router 1-GbE Upgrade Blade (MPX200 blade for redundancy)
 - HP MPX200 Multifunction Router 10-1 GbE Upgrade Blade. Note that FCIP is currently supported only on MPX200 1 GbE ports.

Or

- HP Storage Works MPX200 Full Chassis FCIP License

NOTE: For the Full Chassis FCIP License, you need to install a license for only one of the two blade serial numbers in the chassis. When the Full Chassis FCIP License is applied to the blade it enables both slots. Replacement blades can work in either slot with no need for another FCIP license.

NOTE: For the latest information about operating system and multipath software support, see SPOCK at the website <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access.

Step 2. Pre-installation checklist

Before you begin the configuration process, contact your system administrator for the following information for both sites:

- IP address, subnet mask and gateway for the MPX200 management port (if not using DHCP)
- IP address, subnet mask and gateway for the first available GE port
- IP address of the remote MPX200 that connects to the first available GE port
- IP address, subnet mask and gateway for the second available GE port
- IP address of the remote MPX200 that connects to the second available GE port
- FCIP Link Parameters, Guaranteed Bandwidth, Round-Trip-Time, Quality Of Service, VLAN/Priority

Step 3. Rack-mount the MPX200

See "MPX200 components" (page 26).

Step 4. Install the SFPs

To install the SFPs:

NOTE: An SFP transceiver is required for each FC port that connects to an FC switch.

1. Align the SFP transceiver so that the key is oriented correctly to the port. Transceivers are keyed so that they can be inserted only one way.
2. Insert the transceiver into the port.
3. Press gently until the transceiver snaps into place.

Step 5. Set the MPX200 management port parameters

Use the following steps to set initial MPX200 configuration parameters or, if already configured, go to step 6.

NOTE: If you are using Telnet to configure the MPX200 for the first time, your workstation IP address must be "10.0.0.x," where x is a number other than 1 and the subnet mask is 255.0.0.0.

1. Connect the MPX200 management port or serial console port to a workstation to set the initial MPX200 configuration parameters. You can connect the MPX200 management port to an IP switch, a hub, or directly to the workstation using an Ethernet crossover cable. If you are using the MPX200 serial port, the settings are 115,200 baud, 8 bit, 1 stop bit, no parity, and no flow control.
2. Attach both AC power cords to the PCM located at the front of the MPX200, and a power distribution unit or AC power outlet. Verify that the MPX200 system power LED is lit. The MPX200 runs a self-test and enters operating mode.
3. Verify that the heartbeat LED is blinking (once per second) and that the System fault LED does not light. ["MPX200 chassis diagnostic LEDs" \(page 141\)](#) shows the location of the ports and LEDs on the MPX200.

NOTE: For a description of the LED fault indicators, see the ["MPX200 chassis diagnostics" \(page 141\)](#).

4. Connect to the MPX200 from your management workstation as follows (Figure 108 (page 129)).
 - a. Enter guest at the Login prompt.
 - b. Enter password at the Password prompt.

NOTE: HP recommends that you change the MPX200 guest password after logging in.

5. Enter Blade *n* at the `mpx200#>` prompt, where *n* is the number of the blade in the chassis being configured.
6. Enter `admin start` at the `mpx200 <n>` prompt, where *n* is the number of the blade currently selected in the chassis.
7. Enter the default password `config`.

NOTE: HP recommends that you change the MPX200 config password after logging in.

8. Enter the command `set mgmt` to set the initial parameters.

Follow the on-screen prompts to configure the management port (or press **Enter** to accept the default settings, as shown in [Figure 108 \(page 129\)](#)):

Figure 108 Setting IP addresses

```
MPX200 login: guest
Password:
*****
*          HP StorageWorks MPX200
*****
MPX200 #> blade 1
MPX200 <1> #> admin start
Password      : *****
MPX200 <1> (admin) #> set mgmt
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:
The following command might cause a loss of connections to the MGMT port.

IPv4 Interface (0=Enable, 1=Disable)      [Enabled]      ]
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Static]      ] 0
IPv4 Address                            [10.6.6.90]      ] 10.6.6.90
IPv4 Subnet Mask                         [255.255.240.0] 255.255.240.0
IPv4 Gateway                            [10.6.4.200]      ] 10.6.4.200
IPv6 Interface (0=Enable, 1=Disable)      [Disabled]      ] 0

All attribute values that have been changed will now be saved.

MPX200 <1> (admin) #>
```

The management port is now configured with the appropriate IP address and network parameters.

① **IMPORTANT:** If you are using Telnet to configure the MPX200, the Telnet session is terminated. To restart the Telnet session, use the IP address you just assigned to the management port.

Step 6. Configure the MPX200 FCIP Route parameters

Install FCIP license

For each MPX200 chassis, select the blade with the serial number used to obtain either the Full or Half Chassis License and add the FCIP license as shown in [Figure 109 \(page 129\)](#). A Full Chassis License enables both slots, while a Half Chassis License only enables one slot.

Figure 109 FCIP License Add

```
MPX200 <1> (admin) #> set features
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

Enter feature key to be saved/activated: 4000100-LC71UF10VS7HI-B54C1AED-MPX200-FCIP-1x1Gb

MPX200 <1> (admin) #>
```

Critical FCIP Performance settings

The following four parameters are critical to ensure optimal performance of the MPX200. Configuring the FCIP Route to match the actual link characteristics is the only way to ensure the best utilization of the available bandwidth.

- Bandwidth per route: do not set the bandwidth setting above the guaranteed bandwidth of the link for each FCIP route.
- TCP Window size/scaling factor: Use the recommended setting documented in this guide for the actual bandwidth and RTT of the link.
- For recommendations on setting compression see “IP performance tuning” (page 121).

NOTE: HP recommends that you accept the default settings for TCP Port and GE Port Speed. If you need to change the port speed, select Full Duplex mode; Half Duplex mode is not supported. The Ethernet switch port settings must be set to match the MPX GE port settings.

Configure the FCIP routes using the CLI

For each MPX200, configure the FCIP route information as follows:

```
MPX200 <1> (admin) #> fciproute add

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:
The following command might cause a loss of connections to both GE ports.

Configuring FCIP Route:
-----
FCIP Interfaces FC & GE (0=Enable, 1=Disable) [Enabled] 1
FC Port (1=FC1 2=FC2) [ ] 1
GE Port (1=FC1 2=GE2 3=10GE1 4=10GE2) [ ] 1
IP Address (IPv4 or IPv6; 0=IPv6 Link Local) [0.0.0.0] 66.66.1.94
Subnet Mask [0.0.0.0] 255.255.255.0
Gateway IP Address [0.0.0.0] 
Remote IP Address [0.0.0.0] 66.66.1.124
MTU Size (0=Normal, 1=Jumbo, 2=Other) [Normal] 
TCP Window Size (0=32KB, 1=64KB, 2=128KB,
3=256KB, 4=512KB, 5=1MB,
6=2MB, 7=4MB, 8=8MB, 9=16MB) [4MB] 5
TCP Port No. (Min=1024, Max=65535) [3225] 
GE Port Speed (0=Auto, 1=100Mb, 2=1Gb) [Auto] 
Bandwidth, Mbit/sec (Min=1, Max=1000) [1000] 150
VLAN (0=Enable, 1=Disable) [Disabled] 
FCIP SW Compression(0=Enable,1=Disable,2=Auto) [Disabled] 2

All attribute values for FCIP Route 1 will now be saved.
```

```
MPX200 <1> (admin) #>
```

NOTE: After an FCIP route is configured, the MPX200 CLI command show iSCSI output is invalid for the GE port associated with the FCIP route. The command show fciproutes has multiple lines of output, two of which are GE Link Status and FCIP Link Status. GE Link Status of UP indicates only that the GE port is connected to an Ethernet switch. FCIP Link Status displays the status of the FCIP connection between the FC switches.

Step 7. Configure FC switch settings for the MPX200

Execute the following commands for all B-series FC switches that will use the FCIP link:

- B-Switch# **switchdisable**
- B-Switch# **iodset**
- B-Switch#**aptpolicy [1 or 3]**
- B-Switch#**portcfgislmode [slot/ port], 1** (Must be set for all MPX200 FCIP FC ports regardless of storage types)
- B-Switch# **portcfgport [slot/ port],1** (set for all MPX200 FCIP FC ports)
- B-Switch# **switchenable**

For C-series FC switches, execute the following commands for each VSAN that uses the FCIP link. Enter one command per line.

- C-Switch# **config**
- C-Switch(config)# **in-order-guarantee VSAN n** (where n stands for all VSANs that use the FCIP link)
- C-Switch(config)# **vsan database**
- C-Switch(config-vsan-db)# **vsan n loadbalancing [src-dst-id or src-dst-ox-id]**
- C-Switch(config-vsan-db)# **exit**
- C-Switch(config)# **exit**
- C-Switch# **copy run start**

NOTE:

- For B-series, specify **1** for port-based routing (all XCS versions) or **3** for exchange-based routing (XCS 09534000 or later).
- For C-series, specify **src-dst-id** for port-based routing (all XCS versions) or **src-dst-ox-id** for exchange-based routing (XCS 09534000 or later).
- For port-based routing, set the Continuous Access EVA data replication protocol to HP FC Data Replication Protocol.
- For exchange-based routing, use HP SCSI FC Compliant Data Replication Protocol.

Step 8. Cable the MPX200 FC, GE, and management ports

To cable the MPX200:

1. Connect the management port cable to your Ethernet network, which is accessible from the management server.
2. Connect the cables to the GE1, GE2, FC1, and FC2 ports as shown in the suggested configurations in [Figure 89 \(page 108\)](#), "[MPX200 high-availability configuration with one or two long-distance links](#)" (page 112), "[MPX200 configuration with remote IP Distance gateway \(mpx110\)](#)" (page 113), or "[MPX200 high-availability configuration with fully-redundant long-distance links](#)" (page 113).

NOTE: Use a standard Cat 5e straight network cable to connect MPX200 GE ports to an IP switch port. Use a Cat 5e crossover network cable to directly connect two MPX200s through their respective GE ports without an IP switch.

Step 9. Verify FCIP links and firmware version

1. To determine whether a firmware upgrade is necessary, go to the SPOCK website at <http://www.hp.com/storage/spock>. You must sign up for an HP Passport to enable access. Upgrade accordingly.
2. Use the CLI ping command to verify FCIP link connectivity.

NOTE: When troubleshooting/testing the FCIP route with the MPX200 CLI command ping, always use the largest supported packet size size. Utilizing the default packet size (~56) does not sufficiently stress the link. Also if ping does not work, the FCIP route cannot come online.

3. Use the wanlinktest command to verify the WAN link. See "[wanlinktest command](#)" (page 192).
4. Verify that the FC switches have established an ISL over the FCIP link.

NOTE: After the ISL is established, use the FCPING command to test the ISL connection. Each FC Switch has unique switches to the FCPING command, but generally always test with the maximum frame size allowed and run for an extended period of time to verify a stable connection.

9 MPX200 FCoE feature description

The HP MPX200 Multifunction Router provides FCoE target functionality. Used with the HP arrays, the MPX200 enables FCoE connectivity over a 10-GbE link at no additional cost. FCoE features include:

- 10-GbE model only
- Support enabled with firmware version 3.2.2.0 (minimum) by default, no license required
- FCoE host connectivity to HP P6000 EVA and 3PAR storage
- Management by HP P6000 Command View (P6000 EVA)
- MPX200 simultaneously servicing Fibre Channel, FCoE, and iSCSI hosts
- Simultaneous support with iSCSI/FCoE and one additional function, either data migration or FCIP
- Support for simultaneous iSCSI and FCoE on the same blade or the same 10 GbE port

FCoE configurations

Figure 110 (page 133) shows an FCoE end-to-end direct-connect storage configuration using an MPX200 Multifunction Router and HP storage systems (either P6000 EVA or 3PAR). This configuration provides 10-GbE FCoE and, as an option, iSCSI connectivity for up to two storage systems without the need for any Fibre Channel switches.

Figure 110 FCoE end-to-end direct-connect storage configuration

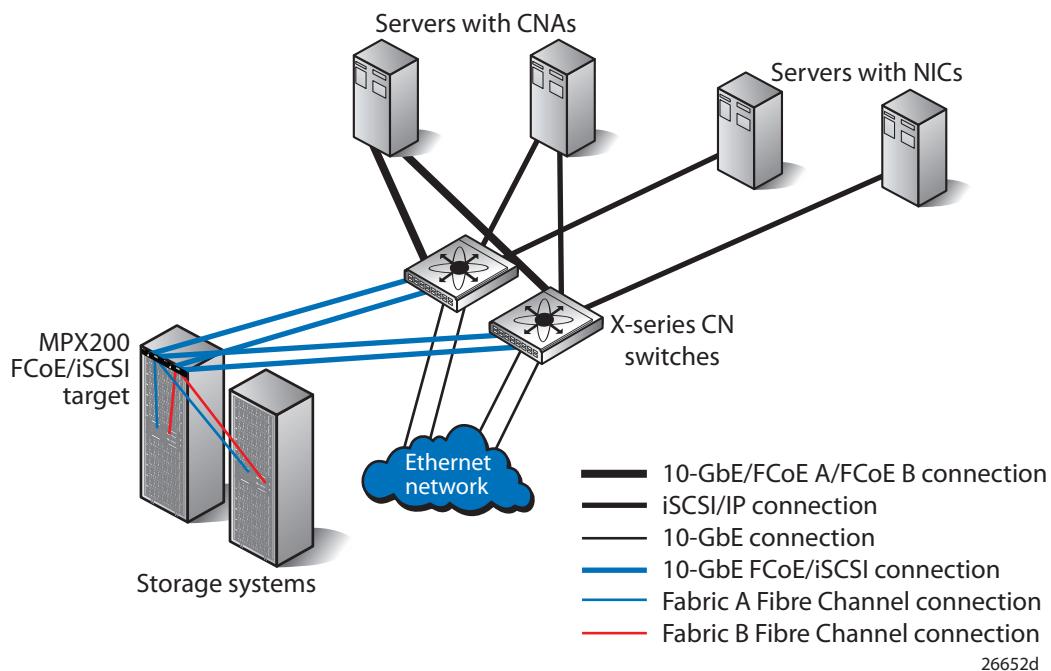
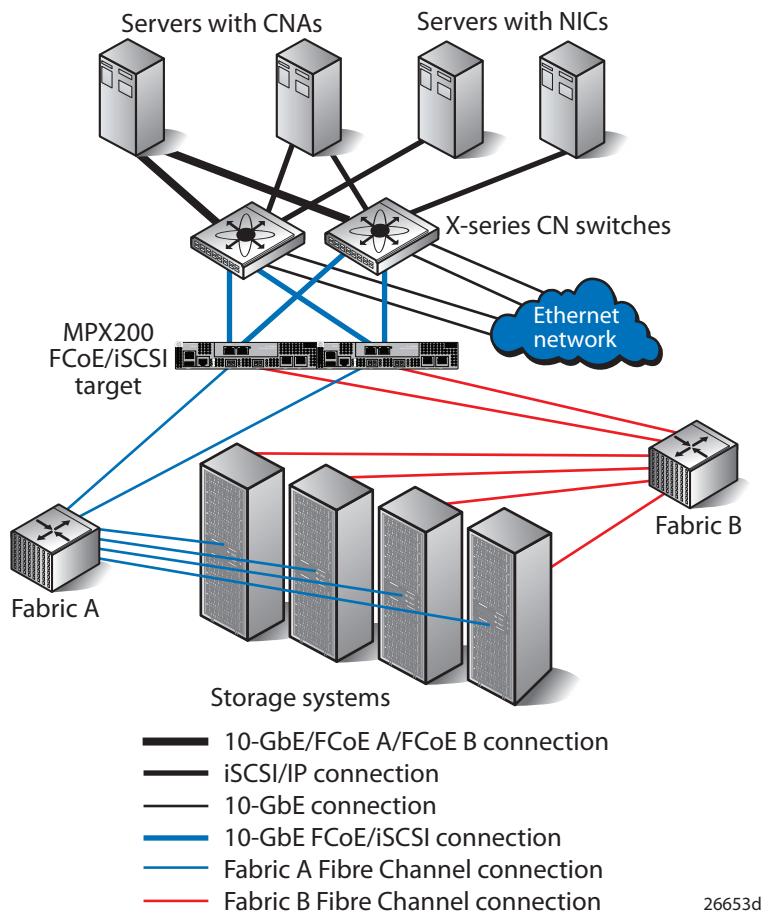


Figure 111 (page 134) shows additional connectivity, allowing up to four storage systems (either P6000 EVA or 3PAR) using a fabric connection between the MPX200 and storage systems. This configuration provides the highest level of multi-protocol support with FCoE, iSCSI, and Fibre Channel connectivity for up to four storage systems. In addition to FCoE and iSCSI, Fibre Channel connected servers can access the same storage systems through the Fibre Channel fabric.

Figure 111 FCoE end-to-end fabric-connect storage configuration



Setting up for FCoE connectivity to HP P6000 EVAs

Before executing the following procedure, ensure that MPX200 discovery has been completed as described in [“Managing MPX200 iSCSI using HP P6000 Command View” \(page 31\)](#).

To set up for FCoE:

1. Configure the FCoE enabled converged network switch. Depending on the switch vendor, configure the ports for FCoE use.

For information regarding switch setup, see the Fibre Channel Over Ethernet chapter of the *HP SAN Design Reference Guide*, available at:

<http://www.hp.com/go/sdgmanuals>

The MPX200 10-GbE ports must be connected to the FCoE switch, as described in the section [“FCoE configurations” \(page 133\)](#).

2. Set up the CNA. For more information regarding CNA configuration, see the *HP Emulex Converged Network Adapter Installation Guide* at:

<http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c02018539/c02018539.pdf>

 - a. Install the driver for the CNA.
 - b. Depending on the CNA vendor, use the management tool to determine the WWNN/WWPN for each port on the CNA.

3. Create an FCoE zone. Zone the WWNN from the MPX200 FCoE port from each blade and the host CNA. If multiple fabrics exist, create zones where redundancy requires it. There are two ways to identify the FCoE ports on the MPX200:

- In HP P6000 Command View, click the FC Ports tab of the iSCSI Controller 0X in the Hardware folder (see [Figure 112 \(page 135\)](#)).
- In the CLI, issue the `show fc` command (see [Figure 113 \(page 136\)](#)).

Figure 112 HP Command View FCoE ports

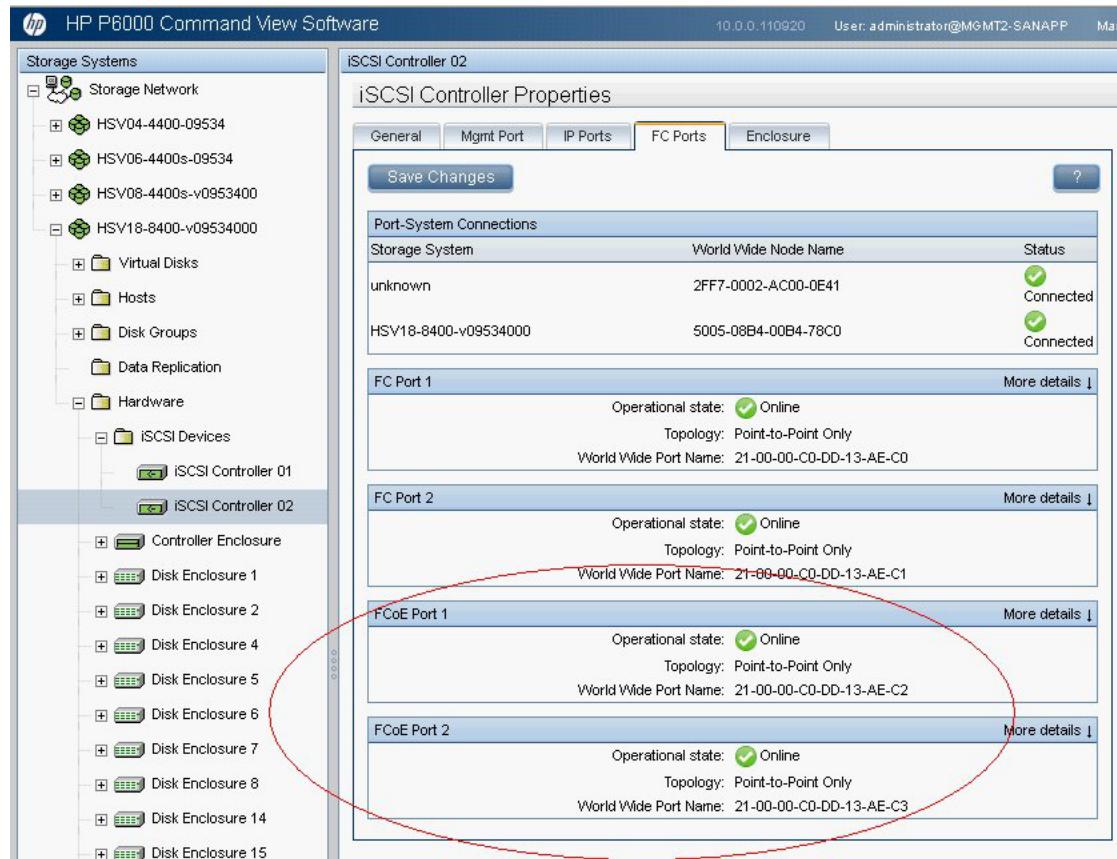


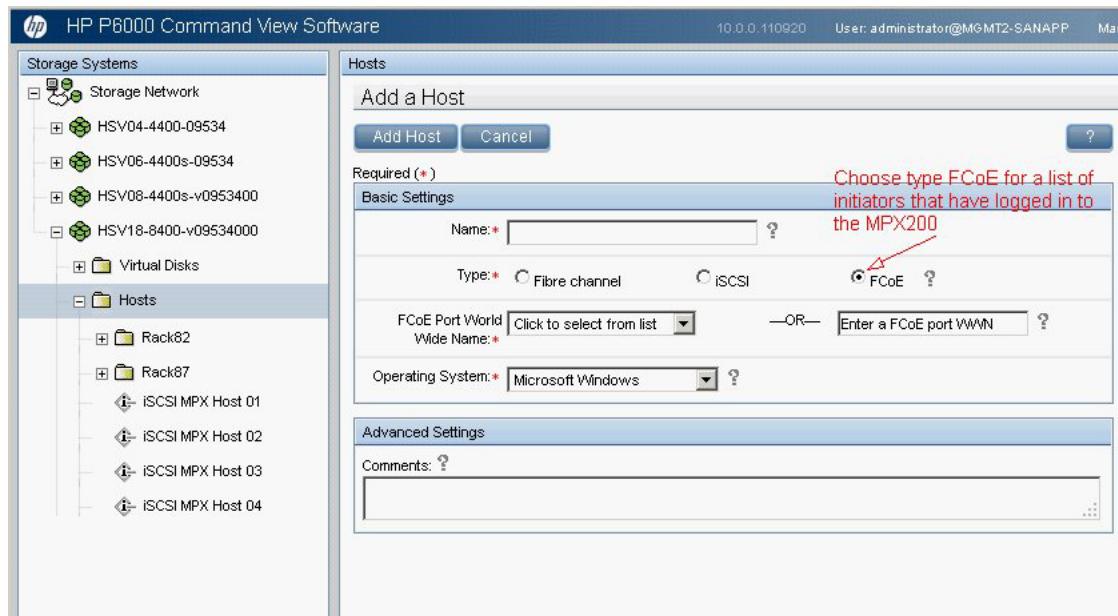
Figure 113 FCoE show fc command

FC Port	FCOE1
Port Status	Enabled
Port Mode	FCP
Link Status	Up
Current Link Rate	10Gb
Programmed Link Rate	Auto
WWNN	20:00:00:c0:dd:13:16:46
WWPN	21:00:00:c0:dd:13:16:46
Port ID	cd-00-2a
Firmware Revision No.	5.02.03
Frame Size	2048
Execution Throttle	256
Connection Mode	Point-to-Point
SFP Type	10Gb
Enode MAC Address	00-c0-dd-13-16-4a
Fabric Provided MAC Address	0e-fc-00-cd-00-2a
VlanId	200
Priority Level	3
Priority GroupId	1
Priority GroupPercentage	50
FC Port	FCOE2
Port Status	Enabled
Port Mode	FCP
Link Status	Up
Current Link Rate	10Gb
Programmed Link Rate	Auto
WWNN	20:00:00:c0:dd:13:16:47
WWPN	21:00:00:c0:dd:13:16:47
Port ID	07-18-01
Firmware Revision No.	5.02.03
Frame Size	2048
Execution Throttle	256
Connection Mode	Point-to-Point
SFP Type	10Gb
Enode MAC Address	00-c0-dd-13-16-4b
Fabric Provided MAC Address	0e-fc-00-07-18-01
VlanId	2
Priority Level	3
Priority GroupId	1
Priority GroupPercentage	80

MPX200 <1> #> 

4. Create the FCoE host:
 - a. Use the Add a Host function to create the FCoE host entry.
 - b. Name the host.
 - c. In the **Type** field, select **FCoE**.
 - d. Select the WWNN that belongs to the host.
 - e. Select the appropriate operating system.
 - f. Click **Add Host** (see [Figure 114 \(page 137\)](#)).

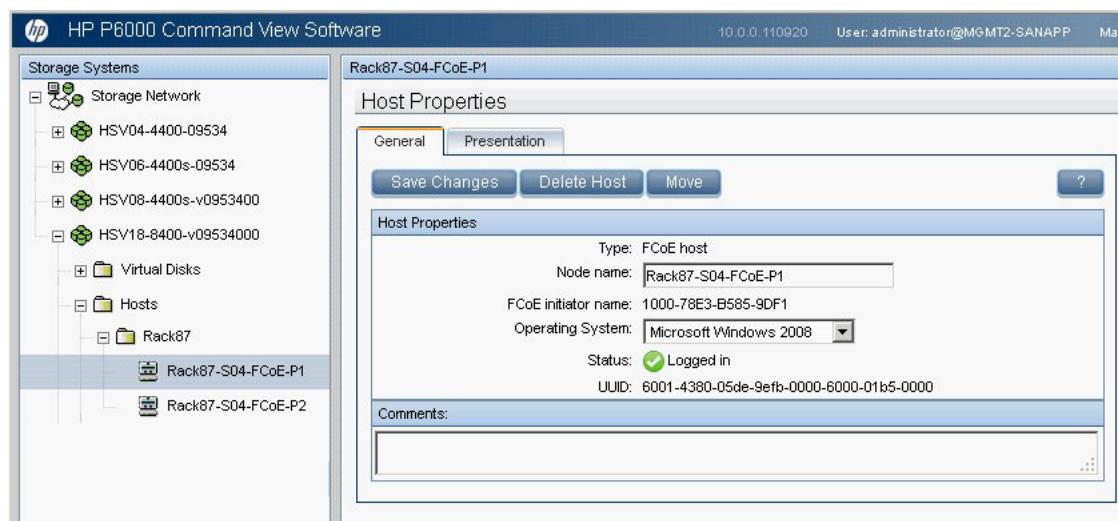
Figure 114 Host type



5. Create a virtual disk and assign it to the FCoE host.

Note that the host has its own icon. Each host entry has only one WWPN associated with it, so any host with multiple port CNAs must have an entry for each (see [Figure 115 \(page 137\)](#)).

Figure 115 Host properties

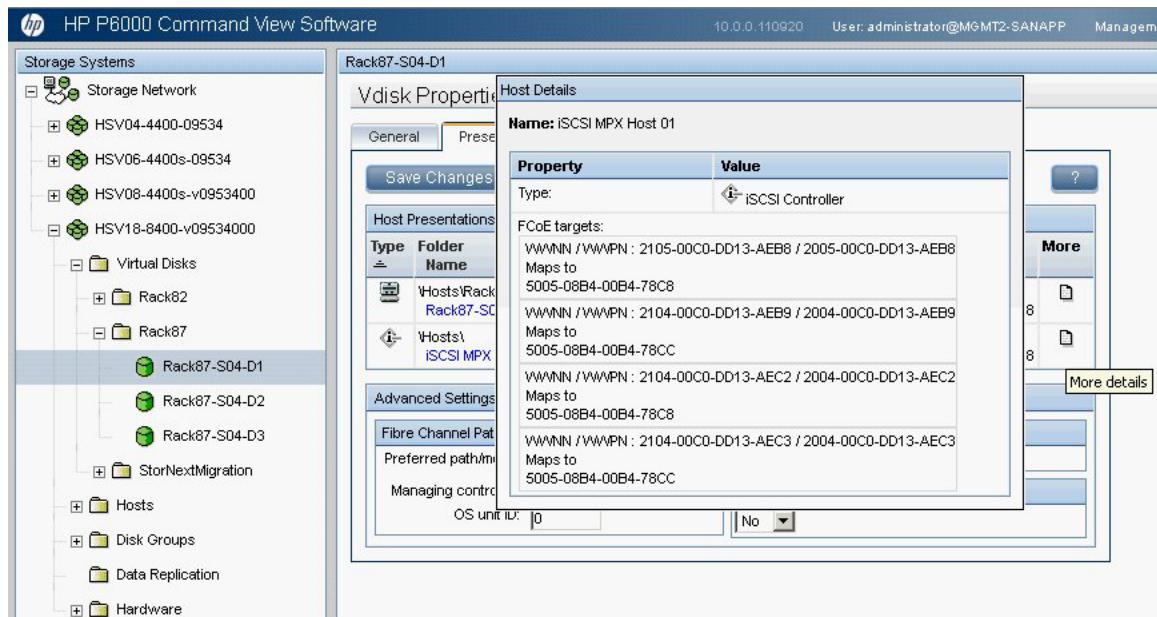


- Add FCoE targets to the FCoE zone.

After the first virtual disk/LUN is presented, the FCoE targets are dynamically created and mapped. In [Figure 116 \(page 138\)](#), if move your cursor over the More icon, a Host Details pop-up appears, showing the FCoE targets and how they map to the P6000 EVA ports. These FCoE WWNNs must be added to the FCoE zone created in [Step 3](#).

NOTE: This step is not required for subsequent Vdisk/LUN assignments for the same or additional hosts.

Figure 116 Host Details display



Setting up FCoE connectivity to 3PAR arrays

Before executing the following procedure, ensure that MPX200 host has been created in the InForm Management Console as described in [“Managing MPX200 iSCSI for 3PAR StoreServ Storage” \(page 40\)](#).

To set up for FCoE:

- Configure the FCoE-enabled converged network switch. Depending on the switch vendor, you might need to configure the ports for FCoE use.

For information about switch setup, see the Fibre Channel Over Ethernet chapter of the HP SAN Design Reference Guide, available at: <http://www.hp.com/go/sdgmanuals>.

- Verify that the MPX200 10-GbE ports are connected to the FCoE switch as described in [“FCoE configurations” \(page 133\)](#).

3. Set up the CNA:

- Install the CNA driver kit.
- Depending on the CNA vendor, use the available management tool to determine the WWNN/WWPN for each port on the CNA.

For more information about CNA configurations, see the *HP Emulex Converged Network Adapter Installation Guide*, available at <http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c02018539/>.

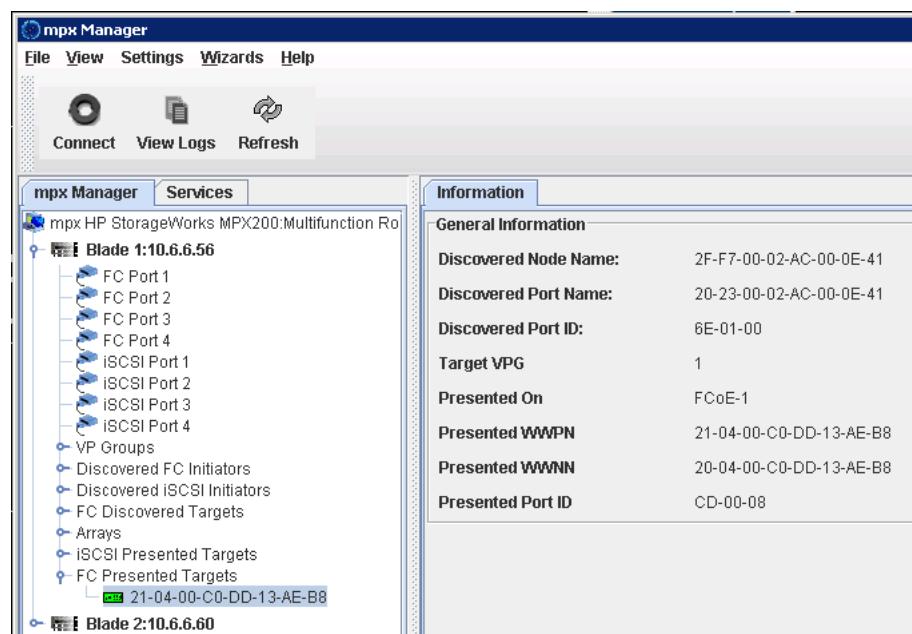
- Create a zone with the MPX200 FCoE ports and the CNA on each fabric.

This registers the CNA worldwide name in the MPX200.

NOTE: Because the same array port worldwide names can be exposed through both MPX200 blades to the fabric, you must create a new target alias.

5. Using the mpx Manager, start the Target Map Wizard:
 - a. On the Select a Target page, expand an array port, and then select a VPGROUP (the same VPG as when the MPX200 host was created in [Step 2, “LUN provisioning” \(page 42\)](#)) and then click **Next**.
 - b. On the Select a Portal page, select an FCoE port, and then click **Finish**.
 - c. To view the target mappings:
 - Click the Refresh icon.
 - Under the selected blade, expand the FC Presented Targets and then select a target. Details appear in the right pane. See [Figure 117 \(page 139\)](#).

Figure 117 Target mapping

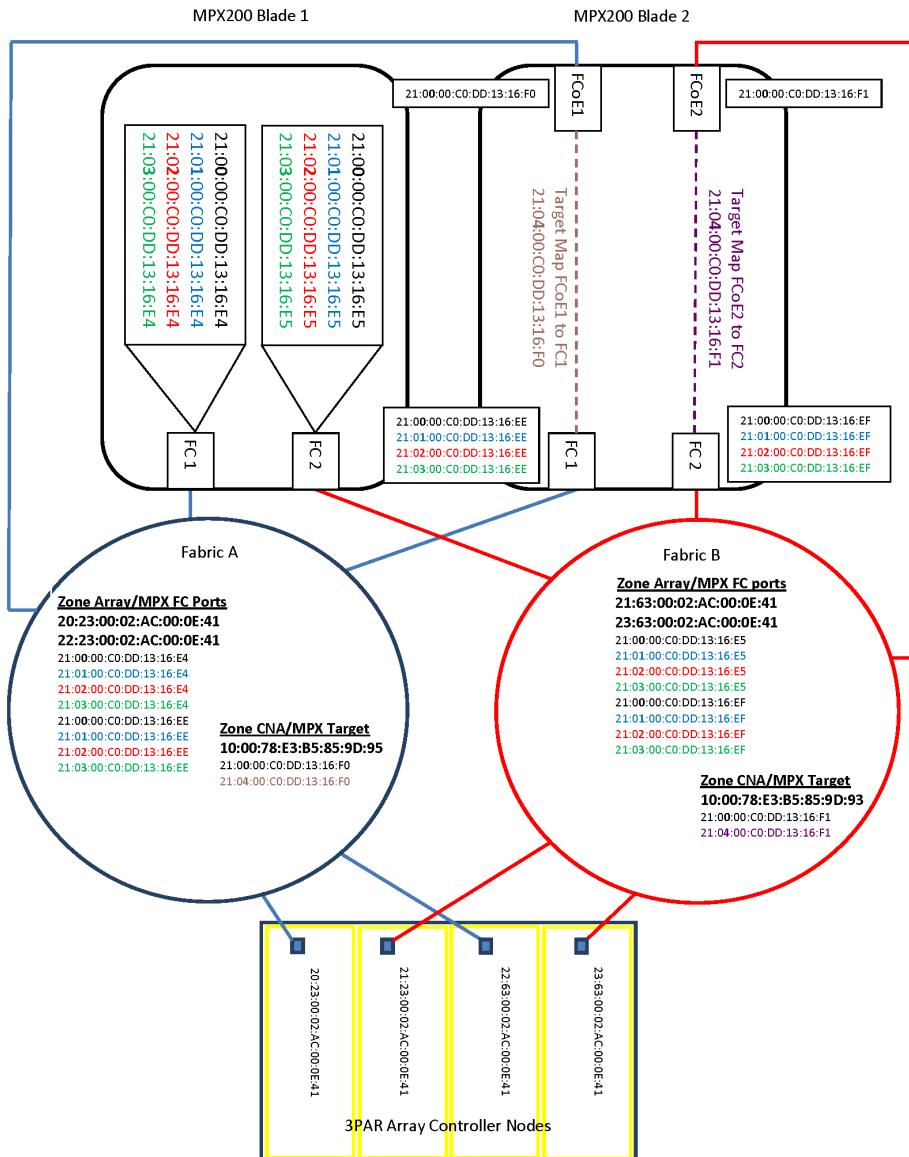


6. Rerun the Target Map Wizard for as many available array ports on each blade.

NOTE: You can cross map ports for redundancy.

- After all target maps have been created, the newly created WWNs can be added to the zone that you created in [Step 4](#).

Figure 118 3PAR MPX zoning — FCoE



- Use the InForm Management Console to provision LUNs to the MPX200 host.
- You can now use the mpx Manager LUN Presentation Wizard for LUN presentation to the initiator.

10 Diagnostics and troubleshooting

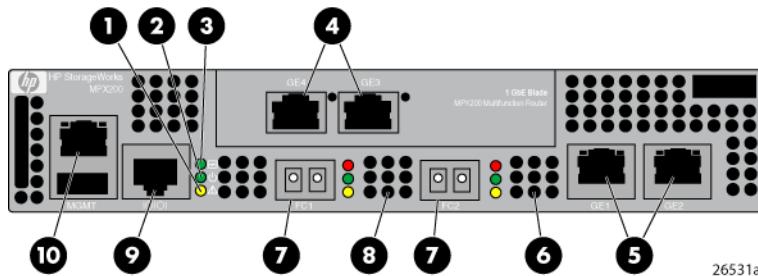
This chapter describes MPX200 chassis diagnostics and provides information to help you troubleshoot problems. Diagnostic information is also available through diagnostics, HP P6000 Command View, and the CLI event logs and error messages.

MPX200 chassis diagnostics

Chassis diagnostics are indicated by the chassis LEDs (see [Figure 119 \(page 141\)](#)).

NOTE: The USB port is unmarked and is not supported.

Figure 119 MPX200 chassis diagnostic LEDs



1. Input fault LED	2. System power LED
3. Heartbeat LED	4. 1-GbE or 10-GbE iSCSI ports
5. 1-GbE iSCSI ports	6. Maintenance button
7. 8-Gb/s FC ports	8. UID beacon (blue LED)
9. RS-232 port	10. Management port 10/100/1000 Ethernet

Input Power LED is extinguished

The Input Power LED is illuminated when the MPX200 logic circuitry is receiving the proper voltage. If the Input Power LED is not illuminated:

1. Inspect the power cord and connectors on the back of the chassis ([Figure 119 \(page 141\)](#)). Is the cord unplugged? Is the cord or connector damaged?
 - If yes, make the necessary corrections or repairs. If the problem persists, proceed to the next step.
 - If not, proceed to the next step.
2. Inspect the AC power source. Is the power source delivering the proper voltage?
 - If yes, proceed to the next step.
 - If not, make the necessary repairs. If the problem persists, proceed to the next step.
3. Replace the MPX200 blade.

System Fault LED is illuminated

The System Fault LED is illuminated when a fault exists in the MPX200 firmware or hardware. If the System Fault LED is illuminated, check the Heartbeat LED for an error blink pattern and take the necessary actions. For more information, see ["Heartbeat LED blink patterns" \(page 142\)](#).

Fibre Channel Port LEDs

- The top LED (2 Gb/s) indicates activity (data) is passing through the port at 2 Gb/s speed.
- The middle LED (4 Gb/s) indicates activity (data) is passing through the port at 4 Gb/s speed.
- The bottom LED (8 Gb/s) indicates activity (data) is passing through the port at 8 Gb/s speed.
- When all three LEDs are blinking, the port is not operational.

POST diagnostics

The MPX200 performs a series of tests as part of its power-on procedure. The POST diagnostic program performs the following tests:

- Memory
- Flash validation
- PCI device discovery
- Management Ethernet port

Heartbeat LED blink patterns

The Heartbeat LED indicates the operational status of the MPX200. When the POST completes with no errors, the Heartbeat LED blinks at a steady rate of once per second. When the MPX200 is in maintenance mode, the Heartbeat LED blinks continuously. The blink patterns that indicate critical errors are described in the following sections. In addition to producing a Heartbeat LED blink pattern, a critical error also illuminates the System Fault LED. The Heartbeat LED shows a blink pattern for the following conditions:

- 1 blink—Normal operation
- 2 blinks—Not used
- 3 blinks—System error
- 4 blinks—Management port IP address conflict
- 5 blinks—Over temperature

Normal blink pattern

A blink pattern of one second ON followed by one second OFF indicates that the MPX200 is operating normally (Figure 120 (page 142)).

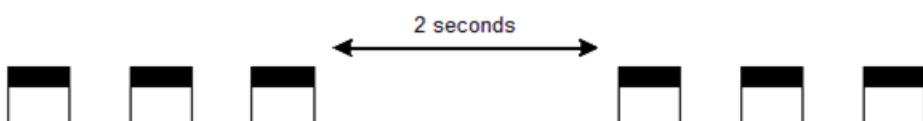
Figure 120 Normal blink pattern



System error blink pattern

A system error is indicated by a three-blink pattern (Figure 121 (page 142)).

Figure 121 System error blink pattern



Management port IP address conflict blink pattern

An IP address conflict on the management port is indicated by a four-blink pattern (Figure 122 (page 143)).

Figure 122 Management port IP address conflict blink pattern

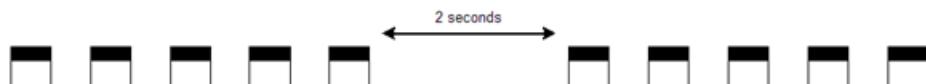


Using the CLI or GUI, the IP address conflict blink pattern may be cleared using the Beacon OFF function.

Over-temperature blink pattern

An over-temperature condition is indicated by a five-blink pattern followed by a two-second pause. The five-blink pattern indicates that the air temperature inside the MPX200 has exceeded the failure temperature threshold of 70 °C (Figure 123 (page 143)).

Figure 123 Over-temperature blink pattern



If the Heartbeat LED shows the over-temperature blink pattern, do the following:

1. Inspect the chassis air vents. Are the intake and exhaust vents clear?
 - If yes, proceed to the next step.
 - If not, remove any debris from the fan intake and exhaust. If the condition persists, proceed to the next step.
2. Consider the ambient air temperature near the MPX200 and the clearance around the MPX200. Make the necessary corrections.
3. If the condition persists, power down the MPX200. Contact your authorized maintenance provider.

Locating the MPX200 blade

A flashing blue LED indicates that the MPX200 blade beacon is ON. There are two ways to identify the location of an MPX200 blade:

- Enter the CLI command `beacon on` (Figure 124 (page 144)).

Figure 124 Using the beacon on command to locate an MPX200 blade



```
telnet 10.6.7.154
MPX200 login: guest
Password:
*****
*          HP StorageWorks MPX200
*          *
*****
MPX200 #> blade 1
MPX200 <1> #> admin start -p config
MPX200 <1> <admin> #> beacon on
MPX200 <1> <admin> #> beacon off
MPX200 <1> <admin> #> _
```

- In HP P6000 Command View, select the **General** tab, and then click the **Locate** button. Use the **Locate ON** and **Locate OFF** buttons to control the blue LED (Figure 125 (page 144)).

Figure 125 Using HP P6000 Command View to locate a hardware device



MPX200 log data

The MPX200 maintains a log that can be displayed through the CLI. The log is persistent through reboots or power cycles. To view the log, use the CLI command `show logs`.

For log data descriptions, see “MPX200 log messages” (page 216), “DM log messages” (page 232).

MPX200 statistics

Statistics for the iSCSI and Fibre Channel ports are available through the CLI. To view statistics, use the CLI command `show stats`.

MPX200 ping command

The `ping` command is the most basic network troubleshooting tool that is available to troubleshoot FCIP route problems. This command runs a diagnostic in which a message is sent to a destination,

the destination echoes a reply, and the command returns the amount of time it took to reach the destination and back.

To troubleshoot an intermittent FCIP link, run the ping command for an extended period of time, recording the output. The output should be evaluated looking for large deviations in the ping-time or lost-packets. Also use the maximum packet-size for the ping test; using the 56-byte default packet size is not a typical packet size for FCIP. [Figure 126 \(page 145\)](#) illustrates the ping command.

Figure 126 FCIP route ping command

```
MPX200-120-124 <1> (admin) #> ping
  IP Address (IPv4 or IPv6)           [0.0.0.0] 44.44.1.90
  Iteration Count (0=Continuously)    [0      ] 5
  Outbound Port (0=Mgmt, 1=GE1, 2=GE2, ...) [Mgmt  ] 2
  Size Of Packet (Min=1, Max=62256 Bytes) [56     ] 62256

  Pinging 44.44.1.90 with 62256 bytes of data: First ping is slow due to ARP request
  Reply from 44.44.1.90: bytes=62256 time=44.0ms
  Reply from 44.44.1.90: bytes=62256 time=40.0ms
  Ping Statistics for 44.44.1.90:
    Packets: Sent = 5, Received = 5, Lost = 0
  Approximate round trip times in milli-seconds:
    Minimum = 40.0ms, Maximum = 44.0ms, Average = 40.4ms
```

FCIP Route Link Failure – Event Log Entries

[Table 29 \(page 145\)](#) provides an example of four event log entries that are typical for a simple link failure. The following two terms used in the event log entries are defined here for clarity:

- A *jiffy* is a time increment; in this error log entry, there are 100 jiffies in a second.
- A *TCP fast retransmission* is one where TCP retries the transmission but does not bring down the connection between the end nodes. In simple terms, it is a lost or duplicate ACK.

Table 29 Event log messages

Sample event log entries	Explanation
Tue Feb 05 23:54:39 EST 2013 FCIP FcipRoute#0: Did not get the keepalive msg from remote peer. Jiffies last 111822002 curr 111824527	Did not receive the keep-alive message from the remote peer in 2525 jiffies or 25.3 seconds.
Tue Feb 05 23:54:39 EST 2013 FCIP FcipRoute#0: TCP Link Down TCP Stats: Timer Expired=1 Fast Retransmissions=59	A 10-second summary of the LINK TCP stats; 1 TCP transmission failed after 59 retries.
Tue Feb 05 23:54:39 EST 2013 FCIP FcipRoute#0: TCP Link Down MAC Stats: Tx Dropped Count=0 Rx Dropped Count=0 Tx Pause Count=0 Rx Pause Count=0	Similar 10-second summary of the LINK MAC stats; No MAC layer frames were dropped and no pause frames were sent or received.
Tue Feb 05 23:54:39 EST 2013 FCIP FcipRoute#0: In last 10 secs TCP Timer Expired=1 Fast Retransmissions=59 OutStanding Completions=0 FC Frames	A summary of the event and the number of outstanding FC Frames.

WANLink diagnostic

NOTE: This command is only supported for use with MPX200 1 GbE ports.

Beginning with version 3.4.0.0, a `wanlinktest` CLI command was added to the MPX200 to facilitate the testing of the WAN link between two MPX200 Multifunction Routers. This diagnostic does not require any data replication software, storage arrays, or even a Fibre Channel connection to test the WAN link. The primary purpose of the diagnostic is to determine the available bandwidth and RTT on the WAN link. These two values are used as look up in tables or to calculate the correct settings to configure the FCIP route that will use the WAN link. For more information, see [“TCP window size/scaling performance tuning” \(page 123\)](#).

The diagnostic output reports two bandwidth numbers: one using TCP protocol and the other using UDP protocol. The UDP bandwidth is the better indicator of the actual size in bandwidth of the WAN link and therefore is used in determining the TCP Windows size/scaling factor. The TCP bandwidth will always be slightly lower than the UDP bandwidth because TCP has more overhead than UDP, but does guarantee delivery. A large difference between the UDP and TCP bandwidth could indicate that there is congestion or excessive packet loss on the WAN link.

NOTE: The resulting UDP bandwidth determined by the diagnostic may not be the bandwidth setting used when configuring the FCIP Route(s). For example, if when testing the WAN link the diagnostic determines there is a 100 Mbps of UDP bandwidth and this link is shared with two pairs of MPX200 routers, then each pair of MPX200 routers would be configured for 50 Mbps or one-half the total bandwidth.

The diagnostic is implemented as a client/server model and only one route can be tested at a time. All normal functions of the GE port under test are disabled while the diagnostic is running. To run the test first on one MPX200, the `wanlinktest setup` command is used to configure the server side of the WAN link. For more information on these commands see [“wanlinktest command” \(page 192\)](#).

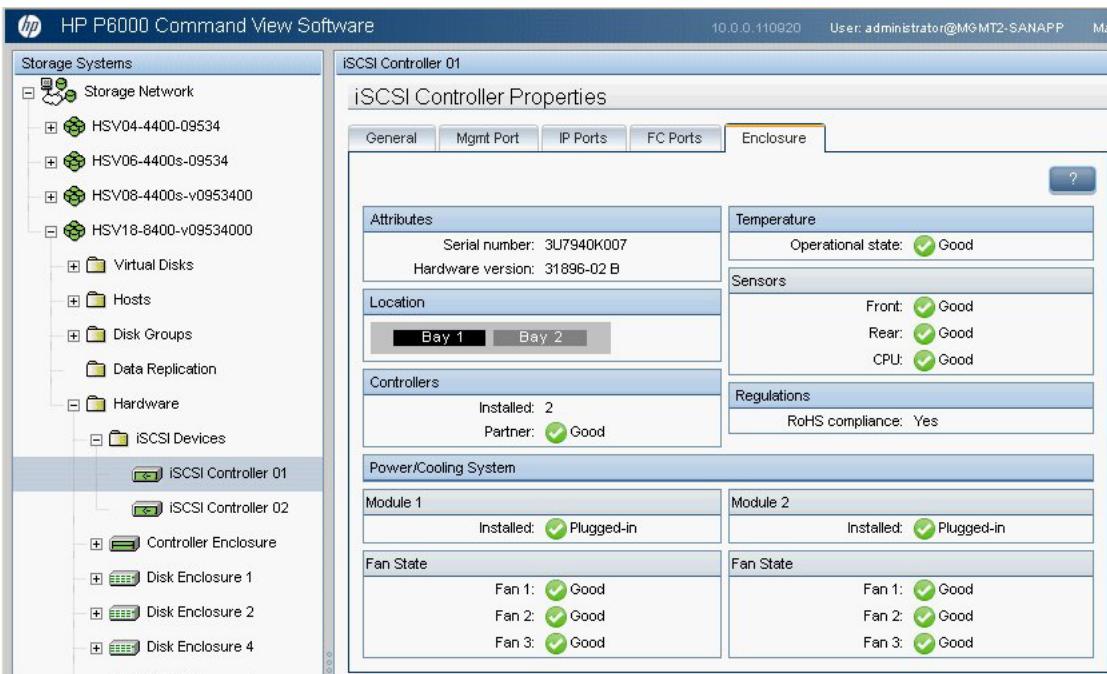
Once the server-side MPX200 is configured, the `wanlinktest start` command is used on the other MPX200 to configure/start the client-side of the diagnostic. Once the test is started, the `wanlinktest show` command can be used on the client side to display a summary result every five minutes while the test is running, or after the test is completed the command will provide a summary report. The `wanlinktest show` command also creates a file named `wan_link_test_results.stats` in the `ftp` directory that contains a one line summary of the last 1024 runs of the diagnostic. When the diagnostic testing is complete, the `wanlinktest stop` command must be executed on the server-side to restore the MPX200 back to normal operating mode.

The minimum time to run the diagnostic is five minutes, but the longer the diagnostic is run the more accurate the results will be. For example, running the diagnostic overnight may identify other traffic congestion periods for backups or other WAN applications sharing the link that might be missed in a shorter test.

Troubleshooting using HP P6000 Command View

You can use HP Command View EVA to display the properties for each iSCSI controller. At a glance, you can check the controller's serial number and temperature and power/cooling status (Figure 127 (page 147)).

Figure 127 iSCSI controller properties



Issues and solutions

HP P6000 Command View does not discover MPX200

Solution 1: Ensure that a DHCP server is available.

Solution 2: Use the CLI to set a static IP address on each MPX200 blade.

Solution 3: Ensure that the HP P6000 Command View station is on the same subnet as the management ports.

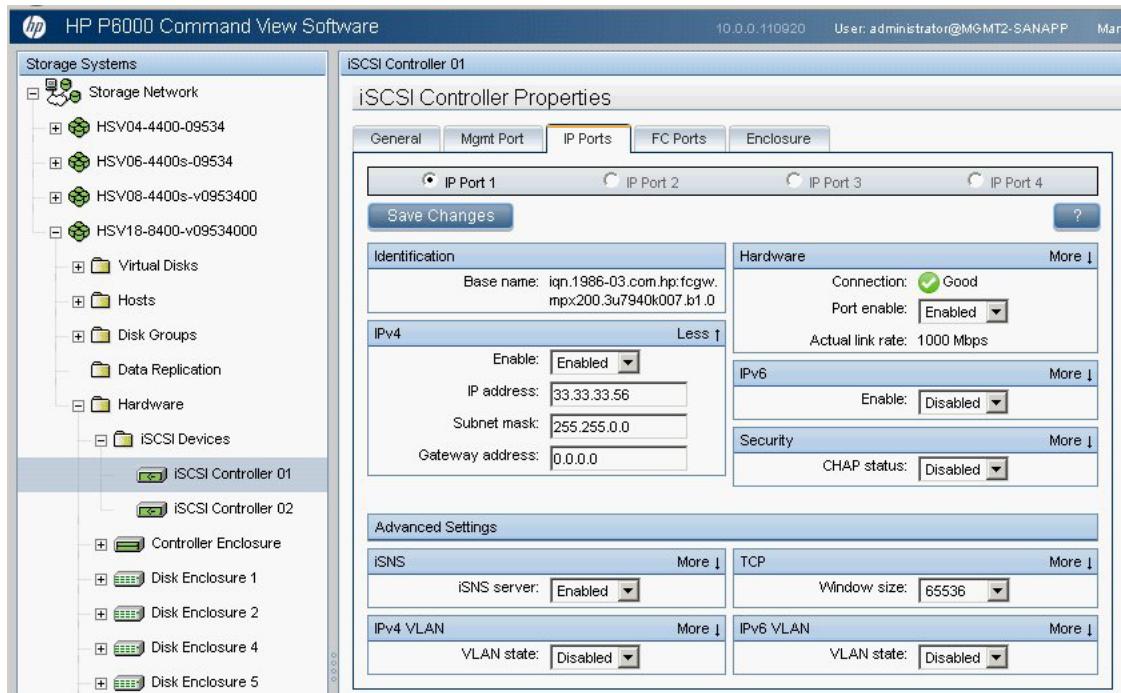
Solution 4: Enter the known IP address of the management port of the iSCSI controller in the HP P6000 Command View discovery screen.

Initiator cannot log in to MPX200 iSCSI target

Solution 1: Ensure that you are using the correct iSCSI port IP address.

Solution 2: In HP P6000 Command View, for each controller, click the **IP ports** tab, and verify the IP Address settings (Figure 128 (page 148)).

Figure 128 iSCSI controller properties: IP Ports tab



Initiator logs in to MPX200 iSCSI target, but P6000 EVA-assigned LUNs do not appear on initiator

Solution 1: The initiator must log in to the target to which the P6000 EVA LUN was assigned.

Solution 2: The P6000 EVA LUN was assigned to a different iSCSI host than was expected.

P6000 EVA-presented virtual disk not seen by initiator

Solution: The initiator must log in to the appropriate iSCSI target. Match the virtual disk presentation properties to the initiator's target login. See [Figure 129 \(page 148\)](#) and [Figure 130 \(page 149\)](#).

Figure 129 Virtual disk properties: Host details

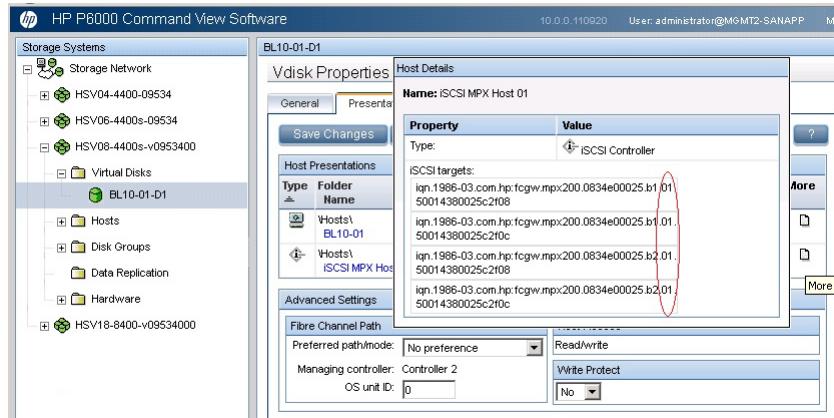
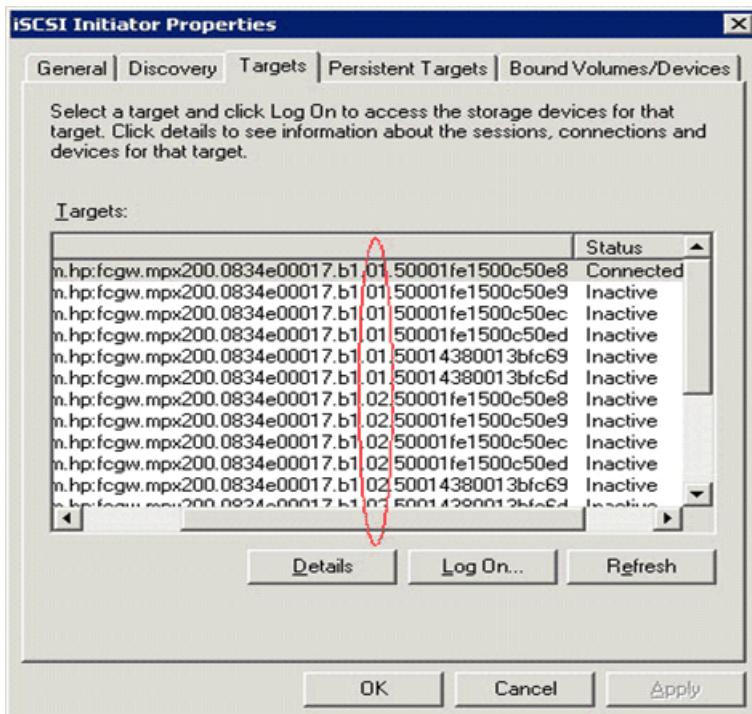


Figure 130 iSCSI initiator properties: Targets tab



Windows initiators may display **Reconnecting** if NIC MTU changes after connection has logged in

Solution. Log out of the sessions and log in again to re-establish the Connected state.

Communication between HP P6000 Command View and MPX200 is down

When communication between HP P6000 Command View and the MPX200 is down, use the following options:

- **Option 1:** Refresh using the **iSCSI Controller** button.
- **Option 2:**
 - If the IPv4 management port IP address is set:
 1. Discover the controller. This option is exposed through **iSCSI controller**→**Set options**→**Discover controller**.
 2. Enter a valid IPv4 management IP address under **Mgmt Port**, and then click **Save changes**.
 - If only the IPv6 management port IP address is set, enter a valid IPv6 management IP address under **Mgmt Port**, and then click **Save changes**.

NOTE: If you configure IPv6 on any MPX200 iSCSI port, you must also configure IPv6 on the HP P6000 Command View management server.

HP P6000 Command View issues and solutions

Issue	Solution
Discovered iSCSI controller was not found with selected P6000 EVA.	Click the Refresh button on the iSCSI Controller Properties page. Check the management port connection. Check all FC connections.

Not a supported configuration. Discovery of the MPX200 controller with Direct Connect Fibre Channel attachment mode is not allowed.	Ensure that the MPX200 is connected to a fabric.
Not a supported configuration. Both MPX200 controllers should be in the same chassis/enclosure.	Only MPX200 blades that are in the same chassis are supported for connectivity. Blades in different chassis are not allowed.
Not a supported configuration. The MPX200 cannot be discovered with this P6000 EVA.	Check FC zoning and connectivity to the P6000 EVA.
Not a supported configuration. The specified MPX200 controller host port does not exist.	A P6000 EVAFC host exists of which the MPX200 FC port is a member. Locate the FC host and remove the port.
Virtual disk operation has failed. Ensure that the FC target connections are online.	Check all MPX200 FC connections to the P6000 EVA (see "Virtual disk operation troubleshooting" (page 150)).
Cannot change iSCSI controller IP port attributes.	Enable the iSCSI controller IP port.
Command not supported with this version of the iSCSI controller.	Check the firmware version and update if necessary.
Unable to process the command at this time. iSCSI controller FC ports are unavailable.	Check all FC connections and zoning.
Invalid iSCSI controller configuration file extension.	Ensure that the correct file is being used to restore the configuration.
Operation failed. iSCSI controller code load file cannot open/read.	The firmware file may be invalid or corrupt. Obtain another copy of the file.
The iSCSI controller code load process has failed.	The code load process may have been interrupted; try again.
Invalid iSCSI controller code load file extension.	Ensure that the correct file is being used.

Virtual disk operation troubleshooting

To view P6000 EVA host ports and Fiber Channel connectivity status, use the procedures below.

To ensure that all P6000 EVA host ports are operational:

1. Open HP P6000 Command View.
2. In the Hardware folder, select a P6000 EVA controller.
3. On the Host Ports tab, view the connection state of the port.
4. Repeat for each P6000 EVA controller.

To check Fiber Channel connections using the CLI:

1. Log into the MPX200 CLI and select blade 1.
2. Type the `show fc` command.
3. Use the `show targets` command to view the state of all targets (all should be online).
4. Confirm that all targets are the intended ports connected from the P6000 EVA controllers. If any target appears that does not belong, you must: Remove the target by adjusting FC zoning; when it is offline, use the `target rm` command to remove it.

NOTE: For firmware 3.3.0.1 or lower, you may have to reboot to clear any offline LUN information.

5. Repeat this procedure for blade 2.

11 Support and other resources

Intended audience

This guide is intended for system administrators with knowledge of:

- HP EVA4x00/6x00/8x00 storage systems
- Configuring LUNs using HP P6000 Command View
- HP Fibre Channel SANs
- Ethernet
- TCP/IP networking
- iSCSI

Related documentation

The following sources provide related information:

- *HP MPX200 Multifunction Router EVA iSCSI Connectivity Quick Start Instructions for Microsoft Windows*
- *HP MPX200 Multifunction Router Release Notes*
- *HP P6000 Command View Software Suite User Guide*
- HP online help for HP P6000 Command View
- HP Enterprise Virtual Array user guide for your array
- *HP SAN Design Reference Guide*
- HP 9500 and XP storage system user guides

You can find the documents referenced in this guide on the Manuals page of the HP Business Support Center website:

<http://www.hp.com/support/manuals>

- For P6000 EVA documents, under Storage, select **Disk Storage Systems**, and then under EVA P6000 Storage, select **HP EVA P6000 Storage**.
- For MPX200 documents, under Storage, select **Storage Networking**, and then under Routers/Gateways/Multiplexers, select **HP MPX200 Multifunction Router**.
- For XP documents, under Storage, select **Disk Storage Systems**, and then under XP P9000 Storage, select your product.

The SAN Design Reference Guide, is available at <http://www.hp.com/go/sdgmanuals>.

Contacting HP

HP technical support

For worldwide technical support information, see the HP support website:

<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages

- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's choice for business website:

<http://www.hp.com/go/e-updates>

After registering, you will receive email notification of product enhancements, new driver versions, firmware updates, and other product resources.

Product feedback

To make comments and suggestions about HP P6000 Command View, send a message to:
CVfeedback@hp.com.

Related information

HP websites

For additional information, see the following HP websites:

- HP:
<http://www.hp.com>
- HP Storage:
<http://www.hp.com/go/storage>
- HP Partner Locator:
http://www.hp.com/service_locator
- HP Software Downloads:
<http://www.hp.com/go/hpsc>
- HP Software Depot:
<http://h20293.www2.hp.com>
- HP Single Point of Connectivity Knowledge (SPOCK)
<http://www.software.hp.com>
- HP SAN manuals:
<http://www.hp.com/go/sdgmanuals>

Typographical conventions

Table 30 Document conventions

Convention	Element
Blue text: Table 30 (page 152)	Cross-reference links and email addresses
Blue, underlined text: http://www.hp.com	Website addresses
Bold text	<ul style="list-style-type: none"> • Keys that are pressed • Text entered into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
<i>Italic</i> text	Text emphasis

Table 30 Document conventions (continued)

Convention	Element
Monospace text	<ul style="list-style-type: none">File and directory namesSystem outputCodeCommands, their arguments, and argument values
<i>Monospace, italic text</i>	<ul style="list-style-type: none">Code variablesCommand variables
Monospace, bold text	Emphasized monospace text
⋮	Indication that example continues

⚠ **WARNING!** Indicates that failure to follow directions could result in bodily harm or death.

⚠ **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

ⓘ **IMPORTANT:** Provides clarifying information or specific instructions.

NOTE: Provides additional information.

💡 **TIP:** Provides helpful hints and shortcuts.

Rack stability

To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- In multiple-rack installations, fasten racks together securely.
- Extend only one rack component at a time. Racks can become unstable if more than one component is extended.

Product warranties

For information about HP product warranties, see the warranty information website:

<http://www.hp.com/go/storagewarranty>

12 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.

A Command reference

This chapter lists and describes the MPX200 CLI commands in alphabetical order.

Command syntax

The MPX200 CLI command syntax uses the following format:

```
command      keyword
            keyword [value]
            keyword [value1] [value2]
```

The command is followed by one or more keywords. Consider the following rules and conventions:

- Commands and keywords are *not* case sensitive.
- Required keyword values appear in standard font within brackets: [value].
- Optional keyword values appear in *italics* within brackets: [value].
- In command prompts, <1> or <2> indicate which blade is being managed.

Command line completion

The command line completion feature makes entering and repeating commands easier. Table 31 (page 155) describes the command line completion keystrokes.

Table 31 Command line completion keystrokes

Keystroke	Description
Tab	Completes the command line. Enter at least one character and press the Tab key to complete the command line. If there is more than one possibility, press Tab again to display all possibilities.
Up arrow	Scrolls backward through the list of previously entered commands.
Down arrow	Scrolls forward through the list of previously entered commands.
Ctrl+A	Moves the cursor to the beginning of the command line.
Ctrl+B	Moves the cursor to the end of the command line.

Authority requirements

You must be in an administrator (Admin) session to perform various set commands. Note that:

- Commands for monitoring tasks are available to all accounts.
- Commands for configuration tasks are available only in an Admin session. An account must have admin authority to execute the `admin start` command, which opens an Admin session (see [admin command](#)).

Commands

This section lists and describes the MPX200 CLI commands in alphabetical order.

Admin

Opens or closes an administrator (Admin) session. You must be in an Admin session to execute commands that change the router configuration. An inactive Admin session times out after 15 minutes.

Authority	Admin session	
Syntax	admin	start (or begin) end (or stop) cancel
Keywords	start (or begin)	Opens the Admin session.
	end (or stop)	Closes the Admin session. The <code>logout</code> , <code>shutdown</code> , and <code>reset</code> commands also end an Admin session.
	cancel	Terminates an Admin session opened by another user. Use this keyword with care because it terminates the Admin session without warning the other user and without saving pending changes.

NOTE: Closing a Telnet window during an Admin session does not release the session. When using Telnet, you must either wait for the Admin session to time out, or use the `admin cancel` command.

Example: The following example shows how to open and close an Admin session:

```
MPX200 <1> #> admin start
Password : *****
MPX200 <1> (admin) #>
.
.
.

MPX200 <1> (admin) #> admin end
MPX200 <1> #>
```

Beacon

Enables or disables the flashing of the blue beacon LED.

Authority	None	
Syntax	beacon	on off
Keywords	on	Turns on the flashing beacon.
	off	Turns off the flashing beacon.

Example: The following example shows how to turn the flashing beacon on:

```
MPX200 <1>#> beacon on
```

Blade

Allows you to select the blade to be managed. This command is valid only at the chassis CLI prompt. The chassis CLI prompt does not include the blade number (for example, MPX200 #>), whereas the blade CLI prompt includes the blade number (for example, MPX200 <1> #>).

Authority	None	
Syntax	blade	[1 or 2]

Example: The following example shows blade 2 being selected at the chassis prompt, followed by the quit command at the blade prompt, which returns control to the chassis prompt:

```
MPX200 #> blade 2  
MPX200 <2> #> quit  
MPX200 #>
```

Clear

Removes all entries (events) from the router log file or resets the FC and iSCSI statistics counters.

Authority	Admin session	
Syntax	clear	logs stats
Keywords	logs	Clears all entries from the router's log file.
	stats	Resets the statistics counters.

Examples: The following examples show the clear commands:

```
MPX200 <1>(admin) #> clear logs  
MPX200 <1>(admin) #> clear stats
```

Date

Displays or sets the date and time. To set the date and time, enter the information in the format MMDhmmCCYY (numeric representation of month-date-hour-minute-century-year). The new date

and time take effect immediately. This ensures that event log entries are dated correctly. You must set the date and time before applying any feature keys or licenses.

Authority	Admin session is required to set the date and time. No authority is required to display the current date and time.	
Syntax	date	[MMDDhhmmCCYY]
Keywords	[MMDDhhmmCCYY]	Specifies the date, which requires an Admin session. If you omit [MMDDhhmmCCYY], the command displays the current date, which does not require an Admin session.

NOTE: Always set the time using Greenwich Mean Time and Universal Transverse Mercator. You must disable NTP before using the date command to set the time.

Example: The following example shows how to set and display the date and time:

```
MPX200 <1>(admin) #> date 010214282009
Fri Jan 2 14:28:00 2009
MPX200 <1>(admin) #> date
Fri Jan 2 14:28:14 2009
```

Exit

Exits the CLI and returns you to the login prompt (same as the quit command).

Authority	None
Syntax	exit

Example 1: The exit command behaves differently depending on whether you are at the chassis management level or blade management level. At the chassis management level, exit returns you to the login prompt. The following example shows the exit command for the chassis:

```
MPX200 #> exit
(none) login:
```

Example 2: At the blade management level, exit returns you to the chassis management level. The following example shows the exit command for the blade:

```
MPX200 <1> (admin) #> exit
HP StorageWorks MPX200 #>
```

Fciproute

Configures a new FCIP route or modifies or deletes an existing FCIP route. Each FCIP route requires a dedicated FC and GbE port. Configuring an FCIP route and specifying an FC and GE port pair take precedence over any previous configuration for the port pair (FC/GE).

Authority	Admin session	
Syntax	fciproute [add mod rm]	
Keywords	add	Configure a new FCIP route
	mod	Modify an existing FCIP route
	rm	Remove an existing FCIP route

Example 1:

```
MPX200 <1> (admin) #> fciproute add
```

A list of attributes with formatting and current values will follow.

Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:

The following command might cause a loss of connections to both GE ports.

Configuring FCIP Route:

```
-----  
FCIP Interfaces FC & GE (0=Enable, 1=Disable) [Enabled] ]  
FC Port (1=FC1 2=FC2) [ ] 1  
GE Port (1=FC1 2=GE2 3=10GE1 4=10GE2) [ ] 1  
IP Address (IPv4 or IPv6; 0=IPv6 Link Local) [0.0.0.0] 66.66.1.94  
Subnet Mask [0.0.0.0] 255.255.255.0  
Gateway IP Address [0.0.0.0]  
Remote IP Address [0.0.0.0] 66.66.1.124  
MTU Size (0=Normal, 1=Jumbo, 2=Other) [Normal]  
TCP Window Size (0=32KB, 1=64KB, 2=128KB,  
3=256KB, 4=512KB, 5=1MB,  
6=2MB, 7=4MB, 8=8MB, 9=16MB) [4MB] 5  
TCP Port No. (Min=1024, Max=65535) [3225]  
GE Port Speed (0=Auto, 1=100Mb, 2=1Gb) [Auto]  
Bandwidth, Mbit/sec (Min=1, Max=1000) [1000] 150  
VLAN (0=Enable, 1=Disable) [Disabled]  
FCIP SW Compression(0=Enable,1=Disable,2=Auto) [Disabled] 2
```

All attribute values for FCIP Route 1 will now be saved.

MPX200 <1> (admin) #>

Example 2:

MPX200 <1> (admin) #> **fciproute mod**

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:

The following command might cause a loss of connections to both GE ports.

Route	FC Port ID	GE Port ID
-----	-----	-----
1	FC1	GE1
2	FC2	GE2

Please select a FCIP route from the list above ('q' to quit): 1

Configuring FCIP Route:

```
-----  
FCIP Interfaces FC & GE (0=Enable, 1=Disable) [Enabled] ]  
IP Address (IPv4 or IPv6; 0=IPv6 Link Local) [66.66.1.94] ]  
Subnet Mask [255.255.255.0] ]  
Gateway IP Address [0.0.0.0] ]  
Remote IP Address [66.66.1.124] ]  
MTU Size (0=Normal, 1=Jumbo, 2=Other) [Normal] ]  
TCP Window Size (0=32KB, 1=64KB, 2=128KB,  
3=256KB, 4=512KB, 5=1MB,  
6=2MB, 7=4MB, 8=8MB, 9=16MB) [1MB] 4  
TCP Port No. (Min=1024, Max=65535) [3225] ]  
GE Port Speed (0=Auto, 1=100Mb, 2=1Gb) [Auto] ]  
Bandwidth, Mbit/sec (Min=1, Max=1000) [150] 100  
VLAN (0=Enable, 1=Disable) [Disabled] ]  
FCIP SW Compression(0=Enable,1=Disable,2=Auto) [Auto] ]  
Do you want to save/discard changes? (0=Save, 1=Discard) [Save] ]
```

All attribute values for FCIP Route 1 will now be saved.

```
MPX200 <1> (admin) #>
```

Example 3:

```
MPX200 <2> (admin) #> fciproute rm
```

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

WARNING:

The following command might cause a loss of connections to both GE ports.

Route	FC Port ID	GE Port ID
1	FC1	GE1
2	FC2	GE2

Please select a FCIP route from the list above ('q' to quit): 1

FCIP Route 1 has been removed from the system.

```
MPX200 <2> (admin) #>
```

FRU

Saves and restores the router configuration.

Authority	Admin session to restore	
Syntax	FRU	restore save
Keywords	restore	The fru restore command requires that you first FTP the tar file containing the configuration to the router. When you issue this command, the system prompts you to enter the restore level. You can fully restore the router's configuration (all configuration parameters and LUN mappings) or restore only the LUN mappings. The restored configuration does not take effect until the router is rebooted.
	save	Creates a tar file containing the blade's persistent data, configuration, and LUN mappings. The file is stored in the router's /var/ftp directory. You must then FTP the tar file from the router.

Example 1: The following is an example of the **fru restore** command:

```
MPX200 <1>(admin) #> fru restore
```

A list of attributes with formatting and current values will follow. Enter a new value or simply press the ENTER key to accept the current value. If you wish to terminate this process before reaching the end of the list press 'q' or 'Q' and the ENTER key to do so.

Type of restore (0=full, 1=mappings only) [full]

FRU restore completed.

Please reboot the system for configuration to take affect.

Example 2: The following is an example of the **fru save** command:

```
MPX200 <1>(admin) #> fru save
```

FRU save completed. Configuration File is **QLogic_Router_FRU.bin**

Please use FTP to extract the file out from the System.

Help

Displays a list of the commands and their syntax.

Authority	None
Syntax	help

Example 1: The help command differs for the chassis and the blade. The following example shows the help command for the chassis:

```
MPX200 #> help
admin [begin | end | start | stop | cancel]
blade [1 | 2]
exit
help
history
logout
quit
reset [factory | mappings]
show [chassis]
```

Example 2: The following example shows the help command for the blade:

```
MPX200 <1> #> help
admin [begin | end | start | stop | cancel]
beacon [ on | off ]
date [MMDDhhmmCCYY]
clear [logs | stats]
exit
fru [restore | save]
help
history
image [cleanup | list | unpack]
image cleanup
image list
image unpack [<filename>]
initiator [add | mod | run]
logout
lunmask [add | rm]
passwd
ping
quit
reboot
reset [factory | mappings]
save [capture | logs | traces]
set [alias | chap | chassis | fc | features | iscsi | isns | mgmt |
ntp | properties | snmp | system | vpgroups]
set alias
set chap
set chassis
set fc [<PORT_NUM>]
set features
set iscsi [<PORT_NUM>]
set isns
set mgmt
set ntp
set properties
set snmp [trap_destinations [<DEST_NUM>]]
set system
set vpgroups [vpgroup index]
show [chap | chassis | fc | features | initiators |
initiators_lunmask | iscsi | isns | logs | luninfo |
luns | lunmask | memory | mgmt | ntp | perf |
presented targets | properties | snmp | stats |
system | targets | vpgroups]
```

```

show chap
show chassis
show fc [<PORT_NUM>]
show features
show initiators [fc | iscsi]
show initiators_lunmask
show iscsi [<PORT_NUM>]
show isns
show logs [<ENTRIES>]
show luninfo
show luns
show lunmask
show memory
show mgmt
show ntp
show perf [byte | init_rbyte | init_wbyte | tgt_rbyte | rgt_wbyte]
show presented_targets [fc|iscsi]
show properties]
show snmp
show stats
show system
show targets [fc | iscsi]
show vpgroups [vpgroup index]
shutdown
target [add | rm]
traceroute

```

History

Displays a numbered list of the previously entered commands.

Authority	None
Syntax	history

Example:

```

MPX200 <1> (admin) #> history
1: admin start
2: help
3: history
MPX200 <1> (admin) #>

```

Image

Updates the router's firmware image and cleans up (removes) the image files in the router's /var/ftp directory.

Authority	Admin session	
Syntax	image	cleanup list [file] unpack [file]
Keywords	cleanup	Removes all firmware image files in the router's /var/ftp directory. These are files transferred by the user when updating the router's firmware image.
	list [file]	Displays a list of the firmware image files in the router's /var/ftp directory.
	unpack [file]	Unpacks the firmware image file specified in the [file] parameter, and then installs the firmware image on the router. Before using this command, you must use FTP to transfer the

	firmware image file to the router's /var/ftp directory. To activate the new firmware, you must reboot the router.
--	---

Example 1:

```
MPX200 <1> (admin) #> image cleanup
```

Example 2:

```
MPX200 <1> (admin) #> image list
Image Location Image File
-----
Blade 1 (local) isr-6200-3_0_0_5.bin
```

Example 3:

```
MPX200 <1> (admin) #> image unpack HP_StorageWorks_MPX200-2_0_0_1.bin
Unpack Completed. Please reboot the system for FW to take effect.
MPX200 <1> (admin) #> reboot
Are you sure you want to reboot the System (y/n) : y
System will now be rebooted...
```

Initiator

Adds, modifies, or removes an initiator in the router's database.

Authority	Admin session	
Syntax	initiator	add mod remove
Keywords	add	Adds an initiator to the router's database.
	mod	Modifies the settings of an initiator.
	remove	Removes a logged-out initiator. You cannot remove an initiator that is currently logged in.

Example 1:

```
MPX200 <1> (admin) #> initiator add
A list of attributes with formatting and current values will follow. Enter a
new value or simply press the ENTER key to accept the current value. If you
wish to terminate this process before reaching the end of the list press 'q' or
'Q' and the ENTER key to do so.
Only valid iSCSI name characters will be accepted. Valid characters include
lower-case alphabetical (a-z), numerical (0-9), colon, hyphen, and period.
iSCSI Initiator Name (Max = 223 characters) [ ]
iqn.1991-05.com.microsoft:server1
OS Type (0=MS Windows, 1=Linux, 2=Other) [MS Windows ]
All attribute values that have been changed will now be saved.
```

Example 2:

```
MPX200 <1> (admin) #> initiator mod
Index (WWNN,WWPN/iSCSI Name)
-----
0 iqn.1991-05.com.microsoft:server1
Please select an Initiator from the list above ('q' to quit): 0
A list of attributes with formatting and current values will follow. Enter a
new value or simply press the ENTER key to accept the current value. If you
wish to terminate this process before reaching the end of the list press 'q' or
'Q' and the ENTER key to do so.
OS Type (0=MS Windows, 1=Linux, 2=Other) [MS Windows ]
All attribute values that have been changed will now be saved.
```

Example 3:

```
MPX200 <1> (admin) #> initiator remove
Index Status (WWNN,WWPN/iSCSI Name)
-----
```

```

0 LoggedOut test
1 LoggedOut iqn.1991-05.com.microsoft:server1
Please select a 'LoggedOut' Initiator from the list above ('q' to quit): 0
All attribute values that have been changed will now be saved.

```

Logout

Exits the CLI and returns you to the login prompt.

Authority	None
Syntax	logout

Example:

```

MPX200 <1> (admin) #> logout
(none) login:

```

Lunmask

Maps a target LUN to an initiator, and removes mappings. The CLI prompts you to select from a list of VPGs, targets, LUNs, and initiators.

Authority	Admin session	
Syntax	lunmask	add remove
Keywords	add	Maps a LUN to an initiator. After you enter the command, the CLI displays a series of prompts from which you choose the initiator, target, and LUN.
	rm	Removes the mapping of a LUN from an initiator. After you enter the command, the CLI displays a series of prompts from which you choose the initiator, target, and LUN.

Example 1: The following example shows the lunmask add command:

```

MPX200 <1> (admin) #> lunmask add
Index (WWNN/iSCSI Name)
-----
0 iqn.1991-05.com.microsoft:server1
Please select an Initiator from the list above ('q' to quit): 0
Index (WWNN,WWPN/iSCSI Name)
-----
0 20:00:00:20:37:fd:8b:ab,22:00:00:20:37:fd:8b:ab
1 20:00:00:20:37:fd:8a:b0,22:00:00:20:37:fd:8a:b0
2 20:00:00:20:37:fd:9c:f7,22:00:00:20:37:fd:9c:f7
3 20:00:00:20:37:fd:8d:00,22:00:00:20:37:fd:8d:00
Please select a Target from the list above ('q' to quit): 0
LUN WWULN Vendor
-----
0 20:00:00:20:37:fd:8b:ab:00:00:00:00:fc:b7:3f:fa SEAGATE
Please select a LUN to present to the initiator ('q' to quit): 0

```

All attribute values that have been changed will now be saved.

Example 2: The following example shows the lunmask add command with VPGs:

```

MPX200 <1> (admin) #> lunmask add
Index Mapped (WWNN,WWPN/iSCSI Name)
-----
0 Yes iqn.1991-05.com.microsoft:server1
Please select an Initiator from the list above ('q' to quit): 0
Index (VpGroup Name)
-----

```

```

1 VPGROUP_1
2 VPGROUP_2
3 VPGROUP_3
4 VPGROUP_4
Multiple VpGroups are currently 'ENABLED'.
Please select a VpGroup from the list above ('q' to quit): 1
Index (WWNN,WWPN/iSCSI Name)
-----
0 50:06:01:60:c1:e0:0d:a2,50:06:01:60:41:e0:0d:a2
1 50:06:01:60:c1:e0:0d:a2,50:06:01:68:41:e0:0d:a2
Please select a Target from the list above ('q' to quit): 0
Index (LUN/VpGroup) Vendor
-----
1 1/VPGROUP_1 DGC
2 2/VPGROUP_1 DGC
3 3/VPGROUP_1 DGC
Please select a LUN to present to the initiator ('q' to quit): 1
All attribute values that have been changed will now be saved.

```

Example 3: The following example shows the lunmask rm command:

```

MPX200 <1> (admin) #> lunmask rm
Index (WWNN,WWPN/iSCSI Name)
-----
0 20:00:00:20:37:fd:8b:ab,22:00:00:20:37:fd:8b:ab
1 20:00:00:20:37:fd:8a:b0,22:00:00:20:37:fd:8a:b0
2 20:00:00:20:37:fd:9c:f7,22:00:00:20:37:fd:9c:f7
3 20:00:00:20:37:fd:8d:00,22:00:00:20:37:fd:8d:00
Please select a Target from the list above ('q' to quit): 0
LUN WWULN Vendor
-----
0 20:00:00:20:37:fd:8b:ab:00:00:00:00:fc:b6:1f:fa SEAGATE
Please select a LUN from the list above ('q' to quit): 0
Index Initiator
-----
0 iqn.1991-05.com.microsoft:server1
Please select an Initiator to remove ('a' to remove all, 'q' to quit): 0
All attribute values that have been changed will now be saved.

```

Example 4: The following example shows the lunmask rm command with VPGs:

```

MPX200 <1> (admin) #> lunmask remove
Index (WWNN,WWPN/iSCSI Name)
-----
0 50:06:01:60:c1:e0:0d:a2,50:06:01:60:41:e0:0d:a2
1 50:06:01:60:c1:e0:0d:a2,50:06:01:68:41:e0:0d:a2
Please select a Target from the list above ('q' to quit): 0
Index (LUN/VpGroup) Vendor
-----
0 0/VPGROUP_1 DGC
1 1/VPGROUP_1 DGC
2 2/VPGROUP_1 DGC
3 3/VPGROUP_1 DGC
4 0/VPGROUP_2 DGC

Please select a LUN from the list above ('q' to quit): 0
Index Initiator
-----
0 iqn.1991-05.com.microsoft:server1
Please select an Initiator to remove ('a' to remove all, 'q' to quit): 0
All attribute values that have been changed will now be saved.
MPX200 <1> (admin) #>

```

Passwd

Changes the guest and administrator passwords.

Authority	Admin session
Syntax	passwd

Example:

```
MPX200 <1>(admin) #> passwd
Press 'q' and the ENTER key to abort this command.
Select password to change (0=guest, 1=admin) : 1
account OLD password : *****
account NEW password (6-128 chars) : *****
please confirm account NEW password : *****
Password has been changed.
```

Ping

Verifies the connectivity of management and GE ports. This command works with both IPv4 and IPv6.

Authority	Admin session
Syntax	ping

Example:

```
MPX200 <1> (admin) #> ping
A list of attributes with formatting and current values will follow. Enter a
new value or simply press the ENTER key to accept the current value. If you
wish to terminate this process before reaching the end of the list press 'q' or
'Q' and the ENTER key to do so.
IP Address (IPv4 or IPv6) [0.0.0.0] fe80::217:a4ff:fe99:c279
Iteration Count (0=Continuously) [0] 10
Outbound Port (0=Mgmt, 1=GE1, 2=GE2, ...) [Mgmt ]
Size Of Packet (Min=1, Max=65486 Bytes) [56 ]
Pinging fe80::217:a4ff:fe99:c279 with 56 bytes of data:
Request timed out.
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.4ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.3ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.3ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.2ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.3ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.3ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.7ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.2ms
Reply from fe80::217:a4ff:fe99:c279: bytes=64 time=0.2ms
Ping Statistics for fe80::217:a4ff:fe99:c279:
Packets: Sent = 10, Received = 9, Lost = 1
Approximate round trip times in milli-seconds:
Minimum = 0.2ms, Maximum = 0.7ms, Average = 0.3ms
```

Quit

Exits the CLI and returns you to the login prompt (same as the exit command).

Authority	None
Syntax	quit

Example 1: The quit command behaves differently depending on whether you are at the chassis management level or blade management level. At the chassis management level, quit returns you to the login prompt. The following example shows the quit command for the chassis:

```
MPX200 <1>(admin) #> quit  
(none) login:
```

At the blade management level, **quit** returns you to the chassis management level. The following example shows the **quit** command for the blade:

```
MPX200 <1>(admin) #> quit  
HP StorageWorks MPX200 #>
```

Reboot

Restarts the blade firmware.

Authority	Admin session
Syntax	reboot

Example:

```
MPX200 <1>(admin) #> reboot  
Are you sure you want to reboot the System (y/n) : y  
System will now be rebooted...
```

Reset

Restores the router configuration parameters to the factory default values. The **reset factory** command deletes all LUN mappings, as well as all persistent data for targets, LUNs, initiators, VPG settings, log files, iSCSI and management IP addresses, FC and Ethernet port statistics, and passwords. This command also restores the factory default IP addresses. The **reset mappings** command clears only the LUN mappings.

Authority	Admin session	
Syntax	reset	factory mappings
Keywords	factory	Deletes all LUN mappings, as well as all persistent data for targets, LUNs, initiators, VPG settings, log files, iSCSI and management IP addresses, FC and Ethernet port statistics, and passwords.
	mappings	Clears only the LUN mappings

Example 1:

```
MPX200 <1>(admin) #> reset factory  
Are you sure you want to restore to factory default settings (y/n) : y  
Please reboot the System for the settings to take effect
```

Example 2:

```
MPX200 <1>(admin) #> reset mappings  
Are you sure you want to reset the mappings in the system (y/n) : y  
Please reboot the System for the settings to take effect.
```

Save

Saves logs and traces.

Authority	Admin session	
Syntax	save	capture logs traces
Keywords	capture	The save capture command creates a debug file that captures all debug dump data. When the command has finished executing, you must FTP the debug capture file from the blade.

	logs	The <code>save logs</code> command creates a <code>tar</code> file that contains the router's log data, storing the file in the router's <code>/var/ftp</code> directory. When the command has finished executing, you must FTP the log's <code>tar</code> file from the blade.
	traces	The <code>save traces</code> command creates a <code>tar</code> file that contains the router's dump data, storing the file in the router's <code>/var/ftp</code> directory. When the command has finished executing, you must FTP the trace's <code>tar</code> file from the blade. The system notifies you if the router does not have any dump data. Each time it generates dump data, the system adds an event log entry.

Example 1:

```
MPX200 <1>(admin) #> save capture
Debug capture completed. Package is System_Capture.tar.gz
Please use FTP to extract the file out from the System.
```

Example 2:

```
MPX200 <1>(admin) #> save logs
Save Event Logs completed. Package is Router_Evl.tar.gz
Please use FTP to extract the file out from the System.
```

Example 3:

```
MPX200 <1>(admin) #> save traces
Save ASIC Traces completed. Package is Router_Asic_Trace.tar.gz
Please use FTP to extract the file out from the System.
```

Set

Configures general router parameters, as well as parameters for the FC, iSCSI, and management ports.

Authority	Admin session	
Syntax	set	alias chap chassis fc [<PORT_NUM>] features iscsi [<PORT_NUM>] isns mgmt ntp properties snmp [trap_destinations [<DEST_NUM>]] system vpgroups [vpgroup index]
Keywords	alias	Assigns an alias name to a presented iSCSI target. See “ set alias command ” (page 169).
	chap	Sets the CHAP secrets. See “ set CHAP command ” (page 169).
	chassis	Sets the chassis name. See “ set chassis command ” (page 170).
	fc [<PORT_NUM>]	Sets the FC port parameters. See “ set FC command ” (page 170).
	features	Applies license keys to the router. See “ set features command ” (page 172).
	iscsi [<PORT_NUM>]	Sets the iSCSI port parameters. See “ set iSCSI command ” (page 172).

isns	Sets the Internet Simple Name Service (iSNS) parameters. See "set iSNS command" (page 172) .
mgmt	Sets the management port parameters. See "set mgmt command" (page 173) .
ntp	Sets the NTP parameters. See "set NTP command" (page 173) .
properties	Configures CLI properties for the blade. See "set properties command" (page 174) .
snmp	Sets the Simple Network Management Protocol (SNMP) parameters, such as the symbolic name and log level. See "set SNMP command" (page 174) .
system	Sets system parameters, such as the symbolic name and log level. See "set system command" (page 175) .
vpgroups [vpgroup index]	Sets VPGs on the blade. See "set VPGroups command" (page 175) .

Set alias

Assigns an alias name to a presented iSCSI target.

Authority	Admin session
Syntax	set alias

Example:

```
MPX200 <2> (admin) #> set alias
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index (WWNN,WWPN/iSCSI Name)
-----
0      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070ce9
1      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070ce9
2      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070ce9
3      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070ce9
4      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070cec
5      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070cec
6      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070cec
7      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070cec
Please select a iSCSI node from the list above ('q' to quit): 0
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
```

Set CHAP

Configures the CHAP parameters.

Authority	Admin session
Syntax	set chap

Example:

```
MPX200 <1>(admin) #> set chap
A list of attributes with formatting and current values will follow. Enter a
new value or simply press the ENTER key to accept the current value. If you
```

```
wish to terminate this process before reaching the end of the list press 'q' or
'Q' and the ENTER key to do so.
Index iSCSI Name
-----
0      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.0
1      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.1
2      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070ce9
3      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070ce9
4      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070ce9
5      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070ce9
6      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070cec
7      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070cec
8      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070cec
9      iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070cec
Please select a presented target from the list above ('q' to quit): 2
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value. If
you wish to terminate this process before reaching the end of the list press
'q' or 'Q' and the ENTER key to do so.
CHAP (0=Enable, 1=Disable) [Disabled] 0
CHAP Secret (Max = 100 characters) [ ] ****
All attribute values that have been changed will now be saved.
```

Set chassis

Sets the chassis name.

Authority	Admin session
Syntax	set chassis

Example:

```
MPX200 <1>(admin) #> set chassis
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Chassis Name (Max = 64 characters) [ ] rack 14
All attribute values that have been changed will now be saved.
```

Set FC

Configures an FC port.

Authority	Admin session	
Syntax	set fc	[<PORT_NUM>]
Keywords	<PORT_NUM> The number of the FC port to be configured.	

Example:

```
MPX200 <1>(admin) #> set fc
A list of attributes with formatting and current values will
follow.
Enter a new value or simply press the ENTER key to accept the
current value. If you wish to terminate this process before
reaching the end of the list press 'q' or 'Q' and the ENTER key to
do so.
WARNING:
The following command might cause a loss of connections to both
ports.
Configuring FC Port: 1
-----
Link Rate (0=Auto, 1=1Gb, 2=2Gb) [Auto]
Frame Size (0=512B, 1=1024B, 2=2048B) [2048]
```

```
Execution Throttle (Min=16, Max=256) [64 ]
Programmed Connection Option:
(0=Loop Only, 1=P2P Only, 2=Loop Pref) [Loop Pref ]
All attribute values for Port 1 that have been changed will now be
saved.
Configuring FC Port: 2
-----
Link Rate (0=Auto, 1=1Gb, 2=2Gb) [Auto ]
Frame Size (0=512B, 1=1024B, 2=2048B) [2048 ]
Execution Throttle (Min=16, Max=256) [64 ]
Programmed Connection Option:
(0=Loop Only, 1=P2P Only, 2=Loop Pref) [Loop Pref ]
All attribute values for Port 2 that have been changed will now be
saved.
```

Set features

Applies license keys to the router. The date and time must be set on the router before applying a new key.

Authority	Admin session	
Syntax	set features	

Set iSCSI

Configures an iSCSI port.

Authority	Admin session	
Syntax	set iscsi	[<PORT_NUM>]
Keywords	[<PORT_NUM>] The number of the iSCSI port to be configured.	

Example:

```
MPX200 <1>(admin) #> set iscsi 1
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
WARNING:
The following command might cause a loss of connections to both ports.
Configuring iSCSI Port: 1
-----
Port Status (0=Enable, 1=Disable) [Enabled ]
Port Speed (0=Auto, 1=100Mb, 2=1Gb) [Auto ]
MTU Size (0=Normal, 1=Jumbo, 2=Other) [Normal ]
Window Size (Min=8124B, Max=1048576B) [65536 ]
IPv4 Address [10.3.5.205 ]
IPv4 Subnet Mask [255.255.255.0 ]
IPv4 Gateway Address [0.0.0.0 ]
IPv4 TCP Port No. (Min=1024, Max=65535) [3260 ]
IPv4 VLAN (0=Enable, 1=Disable) [Disabled ]
IPv6 Address 1 [:: ]
IPv6 Address 2 [:: ]
IPv6 Default Router [:: ]
IPv6 TCP Port No. (Min=1024, Max=65535) [3260 ]
IPv6 VLAN (0=Enable, 1=Disable) [Disabled ]
iSCSI Header Digests (0=Enable, 1=Disable) [Disabled ]
iSCSI Data Digests (0=Enable, 1=Disable) [Disabled ]
All attribute values for Port 1 that have been changed will now be saved.
```

Set iSNS

Configures the blade iSNS parameters.

Authority	Admin session	
Syntax	set isns	

Example:

```
MPX200 <2>(admin) #> set isns
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
```

```
iSNS (0=Enable, 1=Disable) [Disabled] 0
iSNS Address (IPv4 or IPv6) [0.0.0.0] 10.3.6.33
TCP Port No. [3205]
All attribute values that have been changed will now be saved.
```

Set Mgmt

Configures the blade management port (10/100).

Authority	Admin session
Syntax	set mgmt

Example 1:

```
MPX200 <1>(admin) #> set mgmt
A list of attributes with formatting and current values will
follow. Enter a new value or simply press the ENTER key to accept
the current value. If you wish to terminate this process before
reaching the end of the list press 'q' or 'Q' and the ENTER key to
do so.
WARNING:
The following command might cause a loss of connections to the MGMT
port.
IPv4 Interface (0=Enable, 1=Disable) [Enabled]
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Dhcp ]
IPv6 Interface (0=Enable, 1=Disable) [Enabled]
IPv6 Mode (0=Manual, 1=AutoConfigure) [Manual ] 1
All attribute values that have been changed will now be saved.
```

Example 2: The following example shows how to use the **set mgmt** command to set a static address:

```
MPX200 <1>(admin) #> set mgmt
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
WARNING:
The following command might cause a loss of connections to the MGMT port.
IPv4 Interface (0=Enable, 1=Disable) [Enabled ]
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Static ]
IPv4 Address [172.17.136.86 ]
IPv4 Subnet Mask [255.255.255.0 ]
IPv4 Gateway [172.17.136.1 ]
IPv6 Interface (0=Enable, 1=Disable) [Disabled ]
All attribute values that have been changed will now be saved.
```

Set NTP

Configures the NTP parameters.

Authority	Admin session
Syntax	set ntp

Example:

```
MPX200 <1>(admin) #> set ntp
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
NTP (0=Enable, 1=Disable) [Disabled ] 0
TimeZone Offset from GMT (Min=-12:00,Max=12:00) [00:00 ] -8:0
IP Address [1] (IPv4 or IPv6) [0.0.0.0 ] 207.126.97.57
```

```
IP Address [2] (IPv4 or IPv6) [0.0.0.0 ]
IP Address [3] (IPv4 or IPv6) [0.0.0.0 ]
All attribute values that have been changed will now be saved.
```

Set properties

Configures blade CLI properties.

Authority	Admin session
Syntax	set properties

Example:

```
MPX200 <1>(admin) #> set properties
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
CLI Inactivity Timer (0=Disable, 1=15min, 2=60min) [15min ]
CLI Prompt (Max=32 Characters) [HP StorageWorks MPX200 ]
All attribute values that have been changed will now be saved.
```

Set SNMP

Configures general SNMP) properties and eight trap destinations.

Authority	Admin session
Syntax	set snmp [trap_destinations]<DEST_NUM>]

Example 1: The following example shows the set snmp command for setting general properties:

```
MPX200 <1>(admin) #> set snmp
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Configuring SNMP :
-----
Read Community [ ] Public
Trap Community [ ] Private
System Location [ ]
System Contact [ ]
Authentication Traps (0=Enable, 1=Disable) [Disabled ]
All attribute values that have been changed will now be saved.
```

Example 2: The following example shows the set snmp command for configuring an SNMP trap destination:

```
MPX200 <1>(admin) #> set snmp trap_destinations
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Configuring SNMP Trap Destination 1 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ] 0
IP Address [0.0.0.0 ] 10.0.0.5
Destination Port [0 ] 1024
Trap Version [0 ] 2
Configuring SNMP Trap Destination 2 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 3 :
-----
```

```

Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 4 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 5 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 6 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 7 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 8 :
-----
Destination enabled (0=Enable, 1=Disable) [Disabled ]
All attribute values that have been changed will now be saved.

```

Set system

Configures the blade's system-wide parameters.

Authority	Admin session
Syntax	set system

Example:

```

MPX200 <1>(admin) #> set system
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
WARNING:
If enabled by operator, the Symbolic Name can be embedded as part of the
iSCSI Name. Changes to the iSCSI name will be effective after a reboot.
Only valid iSCSI name characters will be accepted. Valid characters include
alphabetical (a-z, A-Z), numerical (0-9), colon, hyphen, and period.
Changes to the Settings below will be effective after a reboot.
System Symbolic Name (Max = 64 characters) [Blade-1 ]
Embed Symbolic Name (0=Enable, 1=Disable) [Disabled ]
Mode (0=iSCSI Server Connectivity),
1=SAN over WAN,
2=iSCSI Server Connectivity/SAN over WAN,
3=Data Migration) [iSCSI Connectivity]
Target Presentation Mode (0=Auto, 1=Manual) [Auto ]
Lun Mapping (0=Enable, 1=Disable) [Disabled ]
Controller Lun AutoMap (0=Enable, 1=Disable) [Enabled ]
Target Access Control (0=Enable, 1=Disable) [Disabled ]
All attribute values that have been changed will now be saved.

```

Set VPGroups

Sets VPGs on the blade. Allows you to enable or disable VPGs, and modify the VPG name.

Authority	Admin session
Syntax	set vpgroups [vpgroup index]

Example: The following example shows how to enable VPGs 2 and 3:

```

MPX200 <1>(admin) #> set vpgroups
The following wizard will query for attributes before persisting
and activating the updated mapping in the system configuration.
If you wish to terminate this wizard before reaching the end of the list

```

```

press 'q' or 'Q' and the ENTER key to do so.
Configuring VpGroup: 1
-----
Status (0=Enable, 1=Disable) [Enabled ]
VpGroup Name (Max = 64 characters) [VPGROUP_1 ]
All attribute values for VpGroup 1 that have been changed will now be saved.
Configuring VpGroup: 2
-----
Status (0=Enable, 1=Disable) [Disabled ] 0
VpGroup Name (Max = 64 characters) [VPGROUP_2 ]
All attribute values for VpGroup 2 that have been changed will now be saved.
Configuring VpGroup: 3
-----
Status (0=Enable, 1=Disable) [Disabled ] 0
VpGroup Name (Max = 64 characters) [VPGROUP_3 ]
All attribute values for VpGroup 3 that have been changed will now be saved.
Configuring VpGroup: 4
-----
Status (0=Enable, 1=Disable) [Disabled ]
All attribute values for VpGroup 4 that have been changed will now be saved.

```

Show

Displays operational information for the blade.

Authority	None	
Syntax	show	chap chassis fc [port_num] features initiators [fc or iscsi] initiators_lunmask iscsi [port_num] isns [port_num] logs [last_x_entries] luninfo lunmask luns memory mgmt ntp perf [byte init_rbyte init_wbyte tgt_rbyte tgt_wbyte] presented_targets [fc or iscsi] properties snmp stats system targets [fc or iscsi] vpgroups [vpgroup index]
Keywords	chap	Displays configured CHAP iSCSI nodes. See “ show CHAP command ” (page 178).
	chassis	Displays chassis information and status. See “ show chassis command ” (page 178).
	fc [port_num]	Displays FC port information. See “ show FC command ” (page 179).
	fciproutes [<link_id>]	Displays the current settings for a particular FCIP route or for all FCIP routes. See “ show fciproutes command ” (page 179).

	features	Displays licensed features. See “ show features command ” (page 180).
	initiators [fc or iscsi]	Displays initiator information for iSCSI or FC. See “ show initiators command ” (page 180).
	initiators_lunmask	Displays initiators and the LUNs to which they are mapped. See “ show initiators LUN mask command ” (page 180).
	iscsi [port_num]	Displays iSCSI port and configuration information. See “ show iSCSI command ” (page 181).
	isns [port_num]	Displays the router’s iSCSI name server (iSNS) configuration. See “ show iSNS command ” (page 181).
	logs [last_x_entries]	Displays the router’s logging information. See “ show logs command ” (page 182).
	luninfo	Displays detailed LUN information for a specified target and LUN. See “ show LUNinfo command ” (page 182).
	lunmask	Displays LUN mappings. See “ show lunmask command ” (page 183).
	luns	Displays information about LUNs and their targets. See “ show LUNs command ” (page 183).
	memory	Displays memory usage. See “ show memory command ” (page 184).
	mgmt	Displays the router’s management port (10/100) configuration. See “ show mgmt command ” (page 184).
	ntp	Displays the router’s NTP configuration. See “ show NTP command ” (page 184).
	perf [byte init_rbyte init_wbyte tgt_rbyte tgt_wbyte]	Displays information about the router performance. See “ show perf command ” (page 185).
	presented_targets [fc or iscsi]	Displays the targets presented by the router: FC, iSCSI, or both. See “ show presented targets command ” (page 186).
	properties	Displays the router properties. See “ show properties command ” (page 187).
	snmp	Displays the router’s SNMP properties and trap configurations. See “ show SNMP command ” (page 187).
	stats	Displays the router FC and iSCSI statistics. See “ show stats command ” (page 187).
	system	Displays router product information, including the serial number, software version, hardware version, configuration, and temperature. See “ show system command ” (page 190).
	targets [fc or iscsi]	Displays the targets discovered by the router: FC, iSCSI, or both. See “ show targets command ” (page 190).
	vpgroups [vpgroup index]	Displays the VPGs. See “ show VPGroups command ” (page 191).

Show CHAP

Displays the CHAP configuration for iSCSI nodes.

Authority	None
Syntax	show chap

Example:

```
MPX200 <1>(admin) #> show chap
The following is a list of iSCSI nodes that have been configured
with CHAP 'ENABLED':
Type iSCSI Node
-----
Init iqn.1991-05.com.microsoft:server1
```

Show chassis

Displays the chassis information and status. You can execute this command from the chassis management level or blade management level.

Authority	None
Syntax	show chassis

Example:

```
MPX200 #>show chassis
Chassis Information
-----
Product Name HP StorageWorks MPX200
Chassis Name Router Chassis Name Here
Serial Number 0834E00019
HW Version 20697-03 A
Fan Speed Normal
Blade 1 Information (Left Slot)
-----
Status Online
Product Name HP StorageWorks MPX200
Symbolic Name Blade-1
Serial Number 0834E00008
HW Version 20694-03 A
SW Version 3.0.1.2
Temp (Front/Rear/CPU1/CPU2) 48C/36C/37C/41C
Power Cooling Module 1
-----
Status Installed
Power Source Connected
Fan1/Fan2/Fan3 Healthy/Healthy/Healthy
Blade 2 Information (Right Slot)
-----
Status Online
Product Name HP StorageWorks MPX200
Symbolic Name Blade-2
Serial Number 0836E00018
HW Version 20694-03 A
SW Version 3.0.1.2
Temp (Front/Rear/CPU1/CPU2) 46C/34C/38C/38C
Power Cooling Module 2
-----
Status Installed
Power Source Not Connected
Fan1/Fan2/Fan3 Healthy/Healthy/Healthy
```

Show FC

Displays FC port information for the specified port. If you do not specify a port, the command displays all ports.

Authority	None	
Syntax	show fc	[port_num]
Keywords	[port_num]	Identifies the number of the FC port.

Example:

```
MPX200 <1>#> show fc 2
FC Port Information
-----
FC Port 2
Link Status Up
Current Link Rate 2Gb
Programmed Link Rate Auto
WWNN 20:00:00:c0:dd:0c:8b:ef
WWPN 21:00:00:c0:dd:0c:8b:ef
Port ID 00-00-ef
Firmware Revision No. 3.03.07
Frame Size 2048
Execution Throttle 64
Connection Mode Loop
Programmed Connection Option Loop Preferred
```

Show fciproutes

Displays the current settings for a particular FCIP route or for all FCIP routes.

Authority	None	
Syntax	show fciproutes [link_id]	
Keywords	[link_id]	Route number to display

Example:

```
MPX200 <2> (admin) #> show fciproutes

FCIP Route Information
-----
FCIP Route 1
FCIP Interfaces Status Enabled
FCIP Link Status Up
FC Port FC1
GE Port GE1
GE Link Status Up
Local IP Address 44.44.1.124
Remote IP Address 44.44.1.158
Subnet Mask 255.255.0.0
Gateway IP Address 0.0.0.0
MTU Size Normal
TCP Window Size 32768
Window Scaling Enabled
Window Scaling Factor 2
TCP Port No 3225
Current GE Port Speed 100Mb/FDX
Programmed GE Port Speed Auto
Bandwidth, Mbit/sec 1000
VLAN Disabled
FCIP SW Compression Disabled
```

```
MPX200 <2> (admin) #>
```

Show features

Displays any licensed features.

Authority	None
Syntax	show features

Example:

```
MPX200 <1>#> show features
No Feature Keys exist in the system.
```

Show initiators

Displays SCSI initiator information for iSCSI.

Authority	None	
Syntax	show features	iscsi
Keywords	fc	Displays FC initiator information.
	iscsi	Displays iSCSI initiator information.

Example:

```
MPX200 <1>#> show initiators
Initiator Information
-----
Initiator Name iqn.1991-05.com.microsoft:server1
Alias
IP Address 0.0.0.0
Status Logged Out
OS Type MS Windows
```

Show initiators LUNmask

Displays all LUNs mapped to the specified initiator.

Authority	None
Syntax	show initiators_lunmask

Example:

```
MPX200 <1>#> show initiators_lunmask
Index (WWNN,WWPN/iSCSI Name)
-----
0 iqn.1991-05.com.microsoft:server1
Please select an Initiator from the list above ('q' to quit): 0
Target (WWPN) (LUN/VpGroup) VendorId
-----
21:00:00:11:c6:17:12:22 0/VPGROUP_1 SEAGATE
50:06:01:60:3a:60:0a:63 0/VPGROUP_2
50:06:01:60:3a:60:0a:63 1/VPGROUP_2
50:06:01:60:3a:60:0a:63 2/VPGROUP_2
50:06:01:60:3a:60:0a:63 3/VPGROUP_2
50:06:01:60:3a:60:0a:63 4/VPGROUP_2
50:06:01:60:3a:60:0a:63 5/VPGROUP_2
50:06:01:60:3a:60:0a:63 6/VPGROUP_2
```

```
50:06:01:60:3a:60:0a:63 7/VPGROUP_2
50:06:01:60:3a:60:0a:63 8/VPGROUP_2
```

Show iSCSI

Displays iSCSI information for the specified port. If you do not specify a port, the command displays all ports.

Authority	None	
Syntax	show iscsi	[port_num]
Keywords	[port_num]	The number of the iSCSI port.

Example:

```
MPX200 <1>(admin) #> show iscsi
iSCSI Port Information
-----
iSCSI Port           GE1
Port Status          Enabled
Link Status          Up
iSCSI Name           ign.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.0
Firmware Revision    3.00.01.57
Current Port Speed   1Gb/FDX
Programmed Port Speed Auto
MTU Size             Jumbo
Window Size          32768
MAC Address          00-c0-dd-13-16-44
IPv4 Address         33.33.50.96
IPv4 Subnet Mask    255.255.0.0
IPv4 Gateway Address 0.0.0.0
IPv4 Target TCP Port No. 3260
IPv4 VLAN            Disabled
IPv6 Address 1       2000:33::37:96:1
IPv6 Address 2       ::
IPv6 Link Local     fe80::2c0:ddff:fe13:1644
IPv6 Default Router  ::
IPv6 Target TCP Port No. 0
IPv6 VLAN            Disabled
iSCSI Max First Burst 65536
iSCSI Max Burst     262144
iSCSI Header Digests Disabled
iSCSI Data Digests  Disabled
```

Show iSNS

Displays iSNS configuration information for the specified iSCSI port. If you do not specify a port, the command displays iSNS configuration information for all iSCSI ports.

Authority	None	
Syntax	show isns	[port_num]
Keywords	[port_num]	The number of the iSCSI port.

Example:

```
MPX200 <2>(admin) #> show isns
iSNS Information
-----
iSNS Disabled
```

Show logs

Displays either all or a portion of the router event log.

Authority	None	
Syntax	show logs	[last_x_entries]
Keywords	[last_x_entries]	Shows only the last x entries in the router event log. For example, show logs 10 displays the last 10 entries in the router event log. The show logs command (without a number) displays the entire router event log.

Example:

```
MPX200 <1>#> show logs
01/01/2008 00:00:13 System 3 Tuesday 01 January 12:13 AM
01/01/2008 00:00:21 QL4022 3 #0: QLIsrDecodeMailbox: Link up
01/01/2008 00:00:13 System 3 Tuesday 01 January 12:13 AM
01/01/2008 00:00:22 QL4022 3 #0: QLIsrDecodeMailbox: Link up
```

Show LUNinfo

Displays detailed information for a specified LUN and target.

Authority	None
Syntax	show luninfo

Example:

```
MPX200 <1>(admin) #> show luninfo
0      50:00:1f:e1:50:07:0c:e0,50:00:1f:e1:50:07:0c:e9
1      50:00:1f:e1:50:07:0c:e0,50:00:1f:e1:50:07:0c:ec

Please select a Target from the list above ('q' to quit):  0

Index  (LUN/VpGroup)
-----
0      0/VPGROUP_1
1      1/VPGROUP_1

Please select a LUN from the list above ('q' to quit):  1

LUN Information
-----
WWULN      50:00:1f:e1:50:07:0c:e0
LUN Number  0
VendorId    HP
ProductId   HSV210
ProdRevLevel 5000
Portal      1
Lun Size    0 MB
Lun State   Online
```

Show LUNs

Displays LUN information for each target.

Authority	None
Syntax	show luns

Example:

```
MPX200 <1>#> show luns
Target (WWPN)          VpGroup          LUN
=====          =====          ===
50:00:1f:e1:50:07:0c:e9  VPGROUP_1          0
                          VPGROUP_1          0
                          VPGROUP_1          1
                          VPGROUP_1          2
                          VPGROUP_1          3
50:00:1f:e1:50:07:0c:ec  VPGROUP_2          0
                          VPGROUP_2          0
                          VPGROUP_2          1
                          VPGROUP_2          2
                          VPGROUP_2          3
```

Show LUNmask

Displays all initiators mapped to the specified LUN.

Authority	None
Syntax	show lunmask

Example:

```
MPX200 <1>#> show lunmask

Index  (WWNN,WWPN/iSCSI Name)
-----
0      50:00:1f:e1:50:07:0c:e0,50:00:1f:e1:50:07:0c:e9
1      50:00:1f:e1:50:07:0c:e0,50:00:1f:e1:50:07:0c:ec

Please select a Target from the list above ('q' to quit):  0

Index  (LUN/VpGroup)
-----
0      0/VPGROUP_1
1      0/VPGROUP_2
2      1/VPGROUP_2
3      2/VPGROUP_2
4      3/VPGROUP_2
5      4/VPGROUP_2
6      5/VPGROUP_2
7      6/VPGROUP_2
8      7/VPGROUP_2
9      8/VPGROUP_2
10     9/VPGROUP_2
11     0/VPGROUP_3
12     0/VPGROUP_4

Please select a LUN from the list above ('q' to quit):  2

Target  50:00:1f:e1:50:07:0c:e0,50:00:1f:e1:50:07:0c:e9
LUN     Initiator
-----
1      iqn.1991-05.com.microsoft:server1
```

Show memory

Displays free and total physical system memory and GE port connections. It does not display information about free space in the /var/ftp/directory.

Authority	None
Syntax	show memory

Example:

```
MPX200 <1>#> show memory
Memory Units Free/Total
-----
Physical 415MB/1002MB
Buffer Pool 6866/8960
Nic Buffer Pool 0/0
Process Blocks 8192/8192
Request Blocks 8192/8192
Event Blocks 2048/2048
Control Blocks 2048/2048
Sessions 2048/2048
Connections:
GE1 256/256
GE2 256/256
GE3 256/256
GE4 256/256
```

Show mgmt

Displays the blade management port (10/100) configuration.

Authority	None
Syntax	show mgmt

Example:

```
MPX200 <1>(admin) #> show mgmt
Management Port Information
-----
IPv4 Interface Enabled
IPv4 Mode Dhcp
IPv4 IP Address 172.17.137.129
IPv4 Subnet Mask 255.255.254.0
IPv4 Gateway 172.17.136.1
IPv6 Interface Disabled
Link Status Up
MAC Address 00-c0-dd-0c-8b-e1
```

Show NTP

Displays the blade NTP configuration.

Authority	None
Syntax	show ntp

Example:

```
MPX200 <1>#> show ntp
NTP Information
-----
Mode Disabled
```

```
Status Offline
TimeZone Offset (Hours) 0
```

Show perf

Displays the port, read, write, initiator, or target performance, in bytes per second (b/s).

Authority	None	
Syntax	show perf	[byte init_rbyte init_wbyte tgt_rbyte tgt_wbyte]
Keywords	byte	Displays performance data for all ports.
	init_rbyte	Displays initiator mode read performance.
	init_wbyte	Displays initiator mode write performance.
	tgt_rbyte	Displays target mode read performance.
	tgt_wbyte	Displays target mode write performance.

Example 1:

```
MPX200 <1>#> show perf
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
```

Port Number	Bytes/s (init_r)	Bytes/s (init_w)	Bytes/s (tgt_r)	Bytes/s (tgt_w)	Bytes/s (total)
GE1	0	0	0	0	0
GE2	0	0	0	0	0
FC1	0	0	0	0	0
FC2	0	0	0	0	0

Example 2:

```
MPX200 <1>#> show perf byte
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Displaying bytes/sec (total) ... (Press any key to stop display)
```

GE1	GE2	FC1	FC2
0	0	0	0
0	0	0	0
0	0	0	0

Example 3:

```
MPX200 <1>#> show perf init_rbyte
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Displaying bytes/sec (initiator mode read) ... (Press any key to
stop display)
GE1 GE2 GE3 GE4 FC1 FC2
-----
0 0 0 0 0 0
0 0 0 0 0 0
```

Example 4:

```
MPX200 <1>#> show perf tgt_wbyte
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Displaying bytes/sec (target mode write) ... (Press any key to
```

```

stop display)
  GE1      GE2      FC1      FC2
  -----
  0        0        0        0
  0        0        0        0
  0        0        0        0
  0        0        0        0

```

Show presented targets

Displays the targets presented by the FC router, iSCSI router, or both.

Authority	None	
Syntax	show presented_targets	fc iscsi
Keywords	fc	Displays FC presented targets.
	iscsi	Displays iSCSI presented targets.

Example 1:

```
MPX200 <1>#> show presented_targets fc
No Presented Targets found.
```

Example 2:

```
MPX200 <1>#> show presented_targets iscsi
Presented Target Information
iSCSI Presented Targets

=====
Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070ce9
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:e9

Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070ce9
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:e9

Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070ce9
Alias
<MAPS to>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:e9

Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070ce9
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:e9

Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.01.50001fe150070cec
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:ec

Name iqnm.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.02.50001fe150070cec
Alias
<MAPS TO>
```

```

WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:ec

Name iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.03.50001fe150070cec
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:ec

Name iqn.1986-03.com.hp:fcgw.mpx200.0834e00025.b1.04.50001fe150070cec
Alias
<MAPS TO>
WWNN 50:00:1f:e1:50:07:0c:e0
WWPN 50:00:1f:e1:50:07:0c:ec

```

Show properties

Displays the router CLI properties.

Authority	None
Syntax	show properties

Example:

```

MPX200 <1>#> show properties
CLI Properties
-----
Inactivity Timer 15 minutes
Prompt String MPX200

```

Show SNMP

Displays the router's SNMP configuration and any configured traps.

Authority	None
Syntax	show snmp

Example:

```

MPX200 <1>(admin) #> show snmp
SNMP Configuration
-----
Read Community Public
Trap Community Private
System Location
System Contact
Authentication traps Disabled
System OID 1.3.6.1.4.1.3873.1.5
System Description HP StorageWorks MPX200
Trap Destination 1
-----
IP Address 10.0.0.5
Trap Port 1024
Trap Version 2

```

Show stats

Displays the blade statistics for FC and iSCSI.

Authority	None
Syntax	show stats

Example:

```
MPX200 <1>#> show stats
FC Port Statistics
-----
FC Port 1
Interrupt Count 23
Target Command Count 0
Initiator Command Count 0
FC Port 2
Interrupt Count 1717443350
Target Command Count 0
Initiator Command Count 1815115822
iSCSI Port Statistics
-----
iSCSI Port 1
Interrupt Count 3108358287
Target Command Count 1815115673
Initiator Command Count 0
MAC Xmit Frames 54392137663
MAC Xmit Byte Count 61199467593726
MAC Xmit Multicast Frames 0
MAC Xmit Broadcast Frames 0
MAC Xmit Pause Frames 0
MAC Xmit Control Frames 0
MAC Xmit Deferrals 0
MAC Xmit Late Collisions 0
MAC Xmit Aborted 0
MAC Xmit Single Collisions 0
MAC Xmit Multiple Collisions 0
MAC Xmit Collisions 0
MAC Xmit Dropped Frames 0
MAC Xmit Jumbo Frames 0
MAC Rcvd Frames 42061498217
MAC Rcvd Byte Count 60362392962831
MAC Rcvd Unknown Control Frames 0
MAC Rcvd Pause Frames 0
MAC Rcvd Control Frames 0
MAC Rcvd Dribbles 0
MAC Rcvd Frame Length Errors 0
MAC Rcvd Jabbers 0
MAC Rcvd Carrier Sense Errors 0
MAC Rcvd Dropped Frames 0
MAC Rcvd CRC Errors 0
MAC Rcvd Encoding Errors 0
MAC Rcvd Length Errors Large 1
MAC Rcvd Small Errors Small 0
MAC Rcvd Multicast Frames 34394
MAC Rcvd Broadcast Frames 33144
iSCSI Port 2
Interrupt Count 51604
Target Command Count 0
Initiator Command Count 0
MAC Xmit Frames 0
MAC Xmit Byte Count 0
MAC Xmit Multicast Frames 0
MAC Xmit Broadcast Frames 0
MAC Xmit Pause Frames 0
MAC Xmit Control Frames 0
MAC Xmit Deferrals 0
MAC Xmit Late Collisions 0
MAC Xmit Aborted 0
MAC Xmit Single Collisions 0
MAC Xmit Multiple Collisions 0
MAC Xmit Collisions 0
```

```
MAC Xmit Dropped Frames 0
MAC Xmit Jumbo Frames 0
MAC Rcvd Frames 186
MAC Rcvd Byte Count 39260
MAC Rcvd Unknown Control Frames 0
MAC Rcvd Pause Frames 0
MAC Rcvd Control Frames 0
MAC Rcvd Dribbles 0
MAC Rcvd Frame Length Errors 0
MAC Rcvd Jabbers 0
MAC Rcvd Carrier Sense Errors 0
MAC Rcvd Dropped Frames 0
MAC Rcvd CRC Errors 0
MAC Rcvd Encoding Errors 0
MAC Rcvd Length Errors Large 0
MAC Rcvd Small Errors Small 0
MAC Rcvd Multicast Frames 94
MAC Rcvd Broadcast Frames 91
iSCSI Shared Statistics
-----
PDUs Xmited 2729500577
Data Bytes Xmited 55036896842234
PDUs Rcvd 2655246170
Data Bytes Rcvd 0
I/O Completed 1815115669
Unexpected I/O Rcvd 0
iSCSI Format Errors 0
Header Digest Errors 0
Data Digest Errors 0
Sequence Errors 0
PDU Xmit Count 2729500577
PDU Xmit Count 2729500577
PDU Xmit Count 2729500577
IP Xmit Packets 54392134283
IP Xmit Byte Count 59132566295008
IP Xmit Fragments 0
IP Rcvd Packets 42061430681
IP Rcvd Byte Count 58764046068744
IP Rcvd Fragments 0
IP Datagram Reassembly Count 0
IP Error Packets 0
IP Fragment Rcvd Overlap 0
IP Fragment Rcvd Out of Order 0
IP Datagram Reassembly Timeouts 0
TCP Xmit Segment Count 54392134284
TCP Xmit Byte Count 57389353022514
TCP Rcvd Segment Count 42061430681
TCP Rcvd Byte Count 57418079800284
TCP Persist Timer Expirations 0
TCP Rxmit Timer Expired 116
TCP Rcvd Duplicate Acks 986657165
TCP Rcvd Pure Acks 816265831
TCP Xmit Delayed Acks 3584507
TCP Rcvd Pure Acks 177811024
TCP Rcvd Segment Errors 0
TCP Rcvd Segment Out of Order 1
TCP Rcvd Window Probes 0
TCP Rcvd Window Updates 18500272TCP ECC Error Corrections 0
```

Show system

Displays blade product information, including the serial number, hardware and software versions, number of ports, and temperature.

Authority	None
Syntax	show system

Example:

```
MPX200 <1>#> show system
System Information
-----
Product Name          HP StorageWorks MPX200
Symbolic Name         Blade-1
System Mode           iSCSI Server Connectivity
Controller Lun AutoMap
Target Access Control
Serial Number         0851E0014
HW Version            20694-03
SW Version            3.0.1.2
Boot Loader Version   0.97.0.4
No. of FC Ports      2
No. of iSCSI Ports   2
Telnet                Enabled
SSH                  Enabled
Temp (Front/Rear/CPU1/CPU2) 42C/31C/34C/34C
```

Show targets

Displays the targets discovered by the FC router, iSCSI router, or both.

Authority	None	
Syntax	show targets	fc iscsi
Keywords	fc	Displays FC targets.
	iscsi	Displays iSCSI targets.

Example 1:

```
MPX200 <1>#> show targets fc
Target Information
-----
WWNN          50:00:1f:e1:50:07:0c:e0
WWPN          50:00:1f:e1:50:07:0c:e9
Port ID       02-f7-01
State         Online

WWNN          50:00:1f:e1:50:07:0c:e0
WWPN          50:00:1f:e1:50:07:0c:ec
Port ID       8b-ad-f2
State         Online
```

Example 2:

```
MPX200 <1>#> show targets iscsi
No Targets found.
```

Show VPGroups

Displays information about the blade configured VPGs.

Authority	None	
Syntax	show vpgroups	[vp index]
Keywords	vp index	The number (1–4) of the VPG to be displayed.

Example 1: The following example shows the `show vpgroups` command for a specific VPG:

```
MPX200 <1>#> show vpgroups 2
  VpGroup Information
  -----
  Index          2
  VpGroup Name  VPGROUP_2
  Status         Enabled
  WWPNs          21:01:00:c0:dd:13:16:44
                  21:01:00:c0:dd:13:16:45
```

Example 2: The following example shows the `show vpgroups` command for all VPGs:

```
MPX200 <1>#> show vpgroups
  VpGroup Information
  -----
  Index          1
  VpGroup Name  VPGROUP_1
  Status         Enabled
  WWPNs          21:00:00:c0:dd:13:16:44
                  21:00:00:c0:dd:13:16:45

  Index          2
  VpGroup Name  VPGROUP_2
  Status         Enabled
  WWPNs          21:01:00:c0:dd:13:16:44
                  21:01:00:c0:dd:13:16:45

  Index          3
  VpGroup Name  VPGROUP_3
  Status         Enabled
  WWPNs          21:02:00:c0:dd:13:16:44
                  21:02:00:c0:dd:13:16:45

  Index          4
  VpGroup Name  VPGROUP_4
  Status         Enabled
  WWPNs          21:03:00:c0:dd:13:16:44
                  21:03:00:c0:dd:13:16:45
```

Shutdown

Shuts down the blade.

Authority	Admin session
Syntax	<code>shutdown</code>

Example:

```
MPX200 <1>(admin) #> shutdown
Are you sure you want to shutdown the System (y/n) : n
Command aborted.
```

Target

Removes an offline target from the blade database. Typically, you use this command to remove targets that are no longer connected to the router.

Authority	Admin session	
Syntax	target	rm
Keywords	rm	Removes a target from the router's target database.

Example:

```
MPX200 <1>(admin) #> target rm
Index State (WWNN,WWPN/iSCSI Name)
-----
0 Offline 20:00:00:14:c3:3d:d2:bf,22:00:00:14:c3:3d:d2:bf
1 Online 20:00:00:14:c3:44:9b:86,22:00:00:14:c3:44:9b:86
2 Online 20:00:00:14:c3:44:9b:9d,22:00:00:14:c3:44:9b:9d
3 Online 20:00:00:14:c3:44:9a:fa,22:00:00:14:c3:44:9a:fa
Please select an OFFLINE Target from the list above ('q' to
quit): 0
All attribute values for that have been changed will now be
saved.
```

Traceroute

Displays the route that a network packet takes to reach the specified destination.

Authority	Admin session
Syntax	traceroute

Example:

```
MPX200 <1>(admin) #> traceroute
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
IP Address (IPv4 or IPv6) [0.0.0.0] 172.35.14.17
Outbound Port (0=Mgmt, 1=GE1, 2=GE2, ...) [Mgmt] 0
Tracing route to 172.35.14.17 over a maximum of 30 hops:
1 172.17.136.2 0.4ms 0.3ms 0.5ms
2 10.7.9.5 1.1ms 1.1ms 1.1ms
3 172.21.130.233 2.7ms 2.7ms 2.6ms
4 172.21.4.245 291.4ms 291.4ms 291.4ms
5 172.21.4.246 413.6ms 417.1ms 439.2ms
6 10.35.9.1 459.1ms 465.6ms 480.0ms
7 172.35.14.17 495.3ms 483.0ms 505.9ms
Traceroute completed in 7 hops.
```

Wanlinktest

Collects data for the WAN link.

Authority	Admin session
Syntax	wanlinktest

Authority	Admin session		
Syntax	wanlinktest	setup start show stop	
Keywords	setup	Configures the WAN link test parameters on the server side of the WAN link.	
	start	Begins running the WAN link test on the client side of the WAN link.	
	show	Displays the outcome of the WAN link test on the client or the status and port number of the server if running.	
	stop	Terminates running the WAN link test.	

NOTE: When setting up or starting the test, ensure that the Gige Port parameter specifies the same port number as the WAN link test server and the client.

Example 1:

The following example illustrates the use of the wanlinktest setup command.

```
MPX200 <2>(admin) #> wanlinktest setup
```

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

```
Gige Port (0=Mgmt, 1=GE1, 2=GE2, ...) [Mgmt      ] 1
Is Local IP already configured (y=yes, n=no) [y        ] N
Local IP Address (IPv4 or IPv6) [0.0.0.0  ] 1.1.1.1
Subnet Mask [0.0.0.0  ] 255.255.255.0
Gateway [0.0.0.0  ]
MTU (Min=582, Max=9000) [1500     ]
VLAN (0=Enable, 1=Disable) [1=Disable]
Server Port to listen On (3225 FCIP/3260 iSCSI) [        ] 3260
```

Started iperf Server on port 1 (socket 3260) sucessfully..!

Example 2:

The following example illustrates the use of the wanlinktest start command.

```
MPX200 <1>(admin) #> wanlinktest start
```

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

```
Gige Port (0=Mgmt, 1=GE1, 2=GE2, ...) [Mgmt      ] 1
Is Local IP already configured (y=yes, n=no) [y        ] N
Local IP Address (IPv4 or IPv6) [0.0.0.0  ] 1.1.1.2
Subnet Mask [0.0.0.0  ] 255.255.255.0
Gateway [0.0.0.0  ]
MTU (Min=582, Max=9000) [1500     ]
VLAN (0=Enable, 1=Disable) [1=Disable]
Test Duration in Minutes (multiples of 5) [10       ]
Server Port to connect to 3225 FCIP/3260 iSCSI) [        ] 3260
```

Checking whether resources are available to start WAN LINK TEST

```
.....  
Wan link test initialization completed successfully
```

Example 3:

The following example illustrates the use of the `wanlinktest show` command.

```
MPX200 <1>(admin) #> wanlinktest show  
Not completed single iteration yet  
Wan link test started for the duration of 10 Minutes at on GigePort 1  
LocalIP: 66.66.1.120 RemoteIP: 66.66.1.90  
Active Iterations.... Press Control+C to quit command  


| StartTime         | EndTime           | RTT    | TCP BW | UDP BW | Jitter | PktDrop% |
|-------------------|-------------------|--------|--------|--------|--------|----------|
| -----             | -----             | ---    | -----  | -----  | -----  | -----    |
| 14:29-Jun/04/2012 | 14:34-Jun/04/2012 | <0.1ms | 948Mb  | 949Mb  | <0.1ms | 0.000%   |
| 14:34-Jun/04/2012 | 14:39-Jun/04/2012 | <0.1ms | 952Mb  | 951Mb  | <0.1ms | 0.000%   |

  
Done With WAN Link Test  
Wan link test started for the duration of 10 Minutes at 14:28-Jun/04/2012 on GigePort 1  
LocalIP: 66.66.1.120 RemoteIP: 66.66.1.90  
  
Average So Far  


| StartTime         | EndTime           | RTT    | TCP BW | UDP BW | Jitter | PktDrop% |
|-------------------|-------------------|--------|--------|--------|--------|----------|
| -----             | -----             | ---    | -----  | -----  | -----  | -----    |
| 14:28-Jun/04/2012 | 14:39-Jun/04/2012 | <0.1ms | 950Mb  | 950Mb  | <0.1ms | 0.000%   |

  
You can ftp wan_link_test_results.stats file to get overall statistics information  
Done With WAN Link Test  
MPX200 <1> (admin) #>
```

Example 4:

The following example illustrates the use of the `wanlinktest show` command on a WAN link test server.

```
MPX200 <1>(admin) #> wanlinktest show  
Wanlinktest server is listening on interface 1.1.1.1 socket port 3260
```

Example 5:

The following example illustrates the use of the `wanlinktest stop` command.

```
MPX200 <1>(admin) #> wanlinktest stop  
Stopping the test  
Wan Link Test stopped successfully
```

B Command Line Interface usage

The CLI enables you to perform a variety of MPX200 management tasks through an Ethernet or serial port connection.

Logging on to an MPX200

You can use either Telnet or SSH to log on to a router, or you can log on to the switch through the serial port.

To log on to a router using Telnet:

1. On the workstation, open a command line window.
2. Enter the Telnet command followed by the router IP address:

```
# telnet <ip address>
```

A Telnet window opens and prompts you to log in.

3. Enter an account name and password.

To log on to a router using SSH:

NOTE: SSH works in a way similar to Telnet, except it uses ROSA to encode transmissions to and from your workstation and the MPX200 blade.

1. On the workstation, open a command line window.
2. Enter the ssh command followed by the router IP address:

```
# ssh <ip address>
```

An SSH window opens and prompts you to log in.

3. Enter an account name and password.

To log on to a switch through the serial port:

1. Configure the workstation port with the following settings:

- 115,200 baud
- 8-bit character
- 1 stop bit
- No parity

2. When prompted, enter an account name and password.

Understanding the guest account

Routers come from the factory with the guest account already defined. This guest account provides access to the router and its configuration. After planning your router management needs, consider changing the password for this account. For information about changing passwords, see the ["passwd command" \(page 166\)](#). The guest account is automatically closed after 15 minutes of inactivity. The initial login opens at the chassis level. From the chassis level, select the blade to be managed. For example:

```
login as: guest
guest@172.17.136.86's password: ****
*****
*      *
*  HP StorageWorks MPX200      *
*      *
*****
MPX200 #>help
blade [ 1 | 2 ]
exit
help
```

```

history
logout
quit
show [ chassis ]
Account name: guest
Password: password

MPX200 #> show chassis
Chassis Information
-----
Product Name HP StorageWorks MPX200
Chassis Name Router Chassis Name
Serial Number 0834E00019
HW Version 20697-03 A
Fan Speed Normal
Blade 1 Information (Left Slot)
-----
Status Online
Product Name HP StorageWorks MPX200
Symbolic Name Blade-1
Serial Number 0834E00008
HW Version 20694-03 A
SW Version 3.0.1.0rc2a
Temp (Front/Rear/CPU1/CPU2) 44C/33C/34C/38C
Power Cooling Module 1
-----
Status Installed
Power Source Connected
Fan1/Fan2/Fan3 Healthy/Healthy/Healthy
Blade 2 Information (Right Slot)
-----
Status Offline
Power Cooling Module 2
-----
Status Installed
Power Source Connected
Fan1/Fan2/Fan3 Healthy/Healthy/Healthy

```

```

MPX200 #>blade 1
MPX200 <1>#>

```

Working with MPX200 router configurations

Successfully managing routers with the CLI depends on effective router configurations. Key router management tasks include modifying configurations, backing up configurations, and restoring configurations.

Modifying a configuration

The router has the following major areas of configuration:

- **Management port configuration** requires the use of the following commands:
 - The “[set mgmt command](#)” (page 173)
 - The “[show mgmt command](#)” (page 184)
- **iSCSI port configuration** requires using the following commands:
 - The “[set iSCSI command](#)” (page 172)
 - The “[show iSCSI command](#)” (page 181)

- **VPG configuration** requires the following commands:
 - The “[set VPGroups command](#)” (page 175)
 - The “[show VPGroups command](#)” (page 191)
- **LUN mapping** requires the use of the “[show lunmask command](#)” (page 183).

Saving and restoring router configurations

Saving and restoring a configuration helps protect your work. You can also use a saved configuration as a template for configuring other routers.

Persistent data consists of system settings, VPG settings, LUN mappings, discovered FC targets, and discovered iSCSI initiators. To save a blade configuration and persistent data:

1. Generate a file (`HP_StorageWorks_MPX200_FRU.bin`) containing the saved data by entering the `fru save` CLI command.
This command stores the file locally on the router in an FTP directory.
2. Transfer the saved data from the router to a workstation by executing an FTP utility on a workstation.

The following example shows an FTP transfer to get the saved router configuration data:

```
c:\> ftp 172.17.137.102
Connected to 172.17.137.102.
220 (none) FTP server (GNU inetutils 1.4.2) ready.
User (172.17.137.102:(none)): ftp
331 Guest login ok, type your name as password.
Password: ftp
230 Guest login ok, access restrictions apply.
ftp> bin
200 Type set to I.
ftp> get HP_StorageWorks_MPX200_FRU.bin
200 PORT command successful.
150 Opening BINARY mode data connection for 'HP_StorageWorks_MPX200_FRU.bin'
(6168 bytes).
226 Transfer complete.
ftp: 6168 bytes received in 0.00Seconds 6168000.00Kbytes/sec.
ftp> quit
221 Goodbye.
```

Restoring router configuration and persistent data

1. Transfer the saved data from a workstation to the router by executing an FTP utility on the workstation.

The following example shows an FTP transfer to put previously saved router configuration data on the router:

```
c:\> ftp 172.17.137.102
Connected to 172.17.137.102.
220 (none) FTP server (GNU inetutils 1.4.2) ready.
User (172.17.137.102: (none)): ftp
331 Guest login ok, type your name as password.
Password: ftp
230 Guest login ok, access restrictions apply.
ftp> bin
```

NOTE: Dual-blade MPX200s perform an automatic FRU restore on a new blade any time it is detected in the chassis.

```
200 Type set to I.
ftp> put HP StorageWorks MPX200_FRU.bin
200 PORT command successful.
150 Opening BINARY mode data connection for 'HP StorageWorks MPX200_FRU.bin'.
226 Transfer complete.
ftp: 6168 bytes sent in 0.00Seconds 6168000.00Kbytes/sec.
ftp> quit
221 Goodbye.
```

2. Update a blade with the saved configuration data by executing the `fru restore` CLI command. The `fru restore` command has the following two options:

- **Full restore** restores all router configuration parameters, including IP addresses, subnet masks, gateways, VPG settings, LUN mappings, and all other persistent data.
- **Partial restore** restores only the LUN mappings and persistent data, such as discovered FC targets and iSCSI initiators.

C Simple Network Management Protocol setup

SNMP provides monitoring and trap functions for managing the router through third-party applications that support SNMP. The router firmware supports SNMP versions 1 and 2 and a QLogic Management Information Base (MIB) (see ["Management Information Base" \(page 200\)](#)). You may format traps using SNMP version 1 or 2.

SNMP parameters

You can set the SNMP parameters using the CLI. For command details, see the ["set SNMP command" \(page 174\)](#).

Table 32 (page 199) describes the SNMP parameters.

Table 32 SNMP parameters

Parameter	Description
Read community	A password that authorizes an SNMP management server to read information from the router. This is a write-only field. The value on the router and the SNMP management server must be the same. The read community password can be up to 32 characters, excluding the number sign (#), semicolon (;), and comma (,). The default password is private.
Trap community	A password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the router and the SNMP management server must be the same. The trap community password can be up to 32 characters, excluding the number sign (#), semicolon (;), and comma (,). The default password is private.
System location	Specifies the name of the router location. The name can be up to 64 characters, excluding the number sign (#), semicolon (;), and comma (,). The default is undefined.
System contact	Specifies the name of the person to be contacted to respond to trap events. The name can be up to 64 characters, excluding the number sign (#), semicolon (;), and comma (,). The default is undefined.
Authentication traps	Enables or disables the generation of authentication traps in response to authentication failures. The default is disabled.

SNMP trap configuration parameters

SNMP trap configuration lets you set up to eight trap destinations. Choose from Trap 1 through Trap 8 to configure each trap. [Table 33 \(page 200\)](#) describes the parameters for configuring an SNMP trap.

Table 33 SNMP trap configuration parameters

Parameter	Description
Trap n enabled ¹	Enables or disables trap n. If disabled, the trap is not configured.
Trap address	Specifies the IP address to which the SNMP traps are sent. A maximum of eight trap addresses are supported. The default address for traps is 0.0.0.0.
Trap port ¹	Port number on which the trap is sent. The default is 162. If the trap destination is not enabled, this value is 0 (zero). Most SNMP managers and management software listen on this port for SNMP traps.
Trap version	Specifies the SNMP version (1 or 2) with which to format traps.

¹ Trap address (other than 0.0.0.0.) and trap port combinations must be unique. For example, if trap 1 and trap 2 have the same address, they must have different port values. Similarly, if trap 1 and trap 2 have the same port value, they must have different addresses.

Management Information Base

This section describes the QLogic MIB.

Network port table

The network port table contains a list of network ports that are operational on the router. The entries in this table include the management port (labeled MGMT) and the GbE ports (labeled GE1 and GE2).

qsrNwPortTable	
Syntax	SEQUENCE OF QsrNwPortEntry
Access	Not accessible
Description	Entries in this table include the management port, and the iSCSI ports on the router.

qsrNwPortEntry	
Syntax	QsrNwPortEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific network port.

A network port entry consists of the following sequence of objects:

qsrNwPortRole	QsrPortRole
qsrNwPortIndex	unsigned32
qsrNwPortAddressMode	INTEGER
qsrIPAddressType	InetAddressType
qsrIPAddress	InetAddress
qsrNetMask	InetAddress
qsrGateway	InetAddress
qsrMacAddress	MacAddress

qsrNwLinkStatus	QsrLinkStatus
qsrNwLinkRate	QsrLinkRate

qsrNwPortRole	
Syntax	QsrPortRole
Access	Not accessible
Description	Operational role of this port: management port or iSCSI port.

qsrNwPortIndex	
Syntax	Unsigned32
Access	Not accessible
Description	A positive integer indexing each network port in a given role.

qsrNwPortAddressMode	
Syntax	INTEGER 1 = Static 2 = DHCP 3 = Bootp 4 = RARP
Access	Read-only
Description	Method by which the port gets its IP address.

qsrlIPAddressType	
Syntax	InetAddressType
Access	Read-only
Description	IP address type: ipv4 or ipv6.

qsrlIPAddress	
Syntax	InetAddress
Access	Read-only
Description	IP address of the port.

qsrNetMask	
Syntax	InetAddress
Access	Read-only
Description	Subnet mask for this port.

qsrGateway	
Syntax	InetAddress
Access	Read-only
Description	Gateway for this port.

qsrMacAddress	
Syntax	IMacAddress
Access	Read-only
Description	MAC address for this port.

qstNwLinkStatus	
Syntax	QsrLinkStatus
Access	Read-only
Description	Operational link status for this port.

qsrNwLinkRate	
Syntax	QsrLinkRate
Access	Read-only
Description	Operational link rate for this port.

FC port table

This table contains a list of the FC ports on the router. There are as many entries in this table as there are FC ports on the router.

qsrFcPortTable	
Syntax	SEQUENCE OF QsrFcPortEntry
Access	Not accessible
Description	A list of the FC ports on the router. The table contains as many entries as there are FC ports on the router.

qsrFcPortEntry	
Syntax	QsrFcPortEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific FC port.

An FC port entry consists of the following sequence of objects:

qsrFcPortRole	QsrPortRole
qsrFcPortIndex	unsigned32
qsrFcPortNodeWwn	PhysAddress
qsrFcPortWwn	PhysAddress
qsrFcPortId	PhysAddress
qsrFcPortType	Unsigned32

qsrFcLinkStatus	QsrLinkStatus
qsrFcLinkRate	QsrLinkRate

qsrFcPortRole	
Syntax	QsrPortRole
Access	Not accessible
Description	Operational role of this port: FCP mode or frame shuttle mode.

qsrFcPortIndex	
Syntax	Unsigned32
Access	Not accessible
Description	A positive integer indexing each FC port in a given role.

qsrFcPortNodeWwn	
Syntax	PhysAddress
Access	Read-only
Description	World Wide Name of the node that contains this port.

qsrFcPortWwn	
Syntax	PhysAddress
Access	Read-only
Description	World Wide Name for this port.

qsrFcPortId	
Syntax	PhysAddress
Access	Read-only
Description	Interface's 24-bit FC address identifier.

qsrFcPortType	
Syntax	Unsigned32
Access	Read-only
Description	Type of FC port, as indicated by the use of the appropriate value assigned by IANA. The IANA-maintained registry for FC port types is located here: www.iana.org/assignments/fc-port-types

qsrFcLinkStatus	
Syntax	QsrLinkStatus
Access	Read-only
Description	Current link status for this port.

qsrfcLinkRate	
Syntax	QsrLinkRate
Access	Read-only
Description	Current link rate for this port.

Initiator object table

The initiator object table is a list of the iSCSI initiators that have been discovered by the router. There are as many entries in this table as there are iSCSI initiators on the router.

qsrlsInitTable	
Syntax	SEQUENCE OF QsrIsInitEntry
Access	Not accessible
Description	Entries in this table contain information about initiators.

qsrlsInitEntry	
Syntax	QsrIsInitEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific iSCSI initiator.

An iSCSI initiator information entry consists of the following sequence of the objects:

qsrlsInitIndex	Unsigned32
qsrlsInitName	SnmpAdminString
qsrlsInitAlias	SnmpAdminString
qsrlsInitAddressType	InetAddressType
qsrlsInitAddress	InetAddress
qsrlsInitStatus	INTEGER
qsrlsInitOsType	SnmpAdminString
qsrlsInitChapEnabled	INTEGER

qsrlsInitIndex	
Syntax	Unsigned32
Access	Not accessible
Description	An arbitrary positive integer denoting each iSCSI initiator discovered by the router.

qsrlsInitName	
Syntax	SnmpAdminString
Access	Not accessible
Description	iSCSI name of the initiator.

qsrlsInitAlias	
Syntax	SnmpAdminString
Access	Read-only
Description	Alias for the iSCSI initiator.

qsrlsInitAddressType	
Syntax	InetAddressType
Access	Read-only
Description	Type of iSCSI initiator's IP address (IPv4 or IPv6).

qsrlsInitAddress	
Syntax	InetAddress
Access	Read-only
Description	IP address of the iSCSI initiator.

qsrlsInitStatus	
Syntax	Integer: 1 = unknown, 2 = loggedIn, 3 = loggedOut, 4 = recovery
Access	Read-only
Description	Status of the iSCSI initiator, that is, whether or not it is logged in to the router.

qsrlsInitOsType	
Syntax	SnmpAdminString
Access	Read-only
Description	The type of the iSCSI initiator's operating system.

qsrlsInitChapEnabled	
Syntax	Integer: 0 = enabled; 2 = disabled
Access	Read-only
Description	A value indicating whether CHAP is enabled or not for this iSCSI initiator.

LUN table

These tables contain information about the LUN list.

qsrlunTable	
Syntax	SEQUENCE OF QsrLunEntry

Access	Not accessible
Description	A list of the LUNs on the FC targets discovered by the router. There are as many entries in this table as there are FC targets on the router.

qsrlunEntry	
Syntax	QsrLunEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific LUN. This table extends scsiDscLunTable in QLOGIC-SCSI-MIB. The entries in this table show other attributes of the LUN.

A LUN entry contains of following sequence of objects.

qsrlunWwuln	PhysAddress
qsrlunVendorId	SnmpAdminString
qsrlunProductId	SnmpAdminString
qsrlunProdRevLevel	SnmpAdminString
qsrlunSize	Unsigned32
qsrlunState	INTEGER
qsrlunVPGroupid	INTEGER
qsrlunVPGroupname	SnmpAdminString

qsrlunWwuln	
Syntax	PhysAddress
Access	Read-only
Description	The WWULN for the LUN.

qsrlunVendorId	
Syntax	SnmpAdminString
Access	Read-only
Description	Vendor ID for the LUN.

qsrlunProductId	
Syntax	SnmpAdminString
Access	Read-only
Description	Product ID for the LUN

qsrlunProdRevLevel	
Syntax	SnmpAdminString
Access	Read-only
Description	Product revision level for the LUN

qsrlunSize	
Syntax	Unsigned32
Access	Read-only
Description	Size of the LUN (in megabytes)

qsrlunState	
Syntax	Integer 1 = online, 2 = offline, 3 = reserved
Access	Read-only
Description	State of the LUN (online or offline)

qsrlunVPGroupid	
Syntax	Integer
Access	Read-only
Description	ID of the VP group to which this LUN belongs

qsrlunVPGroupname	
Syntax	SnmpAdminString
Access	Read-only
Description	VP group name to which this LUN belongs

VP group table

This table contains a list of VPGs. There are four entries in this table at any point of time.

qsrvPGGroupTable	
Syntax	SEQUENCE OF QsrVPGroupEntry
Access	Not accessible
Description	Table for the VP group

qsrvPGGroupEntry	
Syntax	QsrVPGroupEntry
Access	Not accessible
Description	Each entry in the VP group table
Index	{ qsrvPGGroupIndex } ::= { qsrvPGGroupTable 1 }

The QsrVPGroupEntry contains the following sequence of objects:

qsrvPGGroupIndex	Unsigned32
qsrvPGGroupId	INTEGER
qsrvPGGroupName	SnmpAdminString

qsrVPGroupWWNN	VpGroupWwnnAndWwpn
qsrVPGroupWWPN	VpGroupWwnnAndWwpn
qsrVPGroupStatus	INTEGER

qsrVPGroupIndex

Syntax	Unsigned32
Access	Read-only
Description	VP group index.

qsrVPGroupId

Syntax	Integer
Access	Read-only
Description	VP group ID.

qsrVPGroupName

Syntax	SnmpAdminString
Access	Read-only
Description	VP group name or host group name.

qsrVPGroupWWNN

Syntax	VpGroupWwnnAndWwpn
Access	Read-only
Description	WWPN

qsrVPGroupStatus

Syntax	Integer: 0 = enabled; 1 = disabled
Access	Read-only
Description	Maintain the status of the VP group (enabled/disabled)

Sensor table

The sensor table lists all the sensors on the router. Each table row specifies a single sensor.

qsrSensorTable	
Syntax	SEQUENCE OF QsrSensorEntry
Access	Not accessible
Description	List of all the sensors on the router. The table contains as many entries (rows) as there are sensors.

qsrSensorEntry	
Syntax	QsrSensorEntry
Access	Not accessible
Description	Each entry (row) corresponds to a single sensor.

A sensor entry consists of the following sequence of objects:

qsrSensorType	INTEGER
qsrSensorIndex	Unsigned32
qsrSensorUnits	INTEGER
qsrSensorValue	Integer32
qsrUpperThreshold	Integer32
qsrLowerThreshold	Integer32
qsrSensorState	INTEGER

qsrSensorType	
Syntax	INTEGER Temperature = 1
Access	Not accessible
Description	Type of data being measured by this sensor.

qsrSensorIndex	
Syntax	Unsigned32
Access	Not accessible
Description	A positive integer identifying each sensor of a given type.

qsrSensorUnits	
Syntax	INTEGER Celsius = 1
Access	Read-only
Description	Unit of measurement for the sensor.

qsrsensorValue	
Syntax	Integer32
Access	Read-only
Description	Current value of the sensor.

qsrupperThreshold	
Syntax	Integer32
Access	Read-only
Description	Upper-level threshold for this sensor.

qsrlowerThreshold	
Syntax	Integer32
Access	Read-only
Description	Lower-level threshold for this sensor.

qsrsensorState	
Syntax	INTEGER
Access	Read-only
Description	State of this sensor, indicating the health of the system: Unknown = The sensor value/thresholds cannot be determined. Normal = The sensor value is within normal operational limits. Warning = The sensor value is approaching a threshold. Critical = The sensor value has crossed a threshold.

Notifications

This section describes the MPX200 notification types.

NOTE: Every notification uses `qsrbadleslot` as one of the objects. This determines the originator blade for the same notification.

System information objects

System information objects provide the system serial number, version numbers (hardware/software/agent), and number of ports (FC/GE).

qsrserialNumber	
Syntax	SnmpAdminString
Access	Read-only
Description	System serial number.

qsrhwVersion	
Syntax	SnmpAdminString
Access	Read-only
Description	System hardware version number.

qsrSwVersion	
Syntax	SnmpAdminString
Access	Read-only
Description	System software (firmware) version number.

qsrNoOfFcPorts	
Syntax	Unsigned32
Access	Read-only
Description	Quantity of FC ports on the system.

qsrNoOfGbEPorts	
Syntax	Unsigned32
Access	Read-only
Description	Quantity of gigabit Ethernet ports on the system.

qsrAgentVersion	
Syntax	SnmpAdminString
Access	Read-only
Description	Version number of the agent software on the system.

Notification objects

This section defines the objects used in notifications.

qsrEventSeverity	
Syntax	INTEGER
Access	Accessible for notify
Description	Indicates the severity of the event. The value clear specifies that a condition that caused an earlier trap is no longer present.

qsrEventDescription	
Syntax	SnmpAdminString
Access	Accessible for notify
Description	A textual description of the event that occurred.

qsrEventTimeStamp	
Syntax	DateAndTime
Access	Accessible for notify
Description	Indicates when the event occurred.

Agent startup notification

The agent startup notification indicates that the agent on the router has started running. `qsrAgentStartup` uses the `qsrEventTimeStamp` object.

Agent shutdown notification

The agent shutdown notification indicates that the agent on the router is shutting down. `qsrAgentShutdown` uses the `qsrEventTimeStamp` object.

Network port down notification

The network port down notification indicates that the specified network port is down. The next time the port comes up, this event is sent with the `qsrEventSeverity` object set to clear.

`qsrNwPortDown` uses the following objects:

- `qsrNwLinkStatus`
- `qsrEventTimeStamp`
- `qsrEventSeverity`

Network notifications are sent for the following events:

- Management port: down or up
- iSCSI port: down or up
- Port number (1–4)

FC port down notification

The FC port down notification indicates that the specified FC port is down. The next time the port comes up, this event is sent with the `qsrEventSeverity` object set to clear.

`qsrFcPortDown` uses the following objects:

- `qsrFcLinkStatus`
- `qsrEventTimeStamp`
- `qsrEventSeverity`

FC notifications are sent for the following events:

- Fibre Channel port: down or up
- Port number (1–4)

Target device discovery

The Fibre Channel target device discovery notification indicates that the specified Fibre Channel target is online or offline.

`qsrDscTgtStatusChanged` uses the following objects:

- `qsrBladeSlot`
- `qsrEventTimeStamp`
- `qsrFcTgtState`
- `qsrEventSeverity`

FC target device discovery notifications are sent for the following event:

- FC Target
 - State: Discovered, went offline, or went online
 - Target WWPN
 - Blade number (1 or 2)

Target presentation (mapping)

The target presentation notification indicates that the specified target has been presented (mapped) or unpresented (unmapped).

`qsrPresTgtMapped` uses the following objects:

- `qsrBladeSlot`
- `qsrEventTimeStamp`
- `qsrPresTgtMapped`
- `qsrPresTgtUnmapped`
- `qsrEventSeverity`

Target presentation notifications are sent for the following event:

- Target Presentation
 - State: Presented (mapped) or unpresented (unmapped)
 - Target name
 - Blade number (1 or 2)

VP group notification

The VP group notification indicates that the specified VP group is enabled or disabled. It also represents change in the name of the VP group.

`qsrVPGroupStatusChanged` uses the following objects:

- `qsrBladeSlot`
- `qsrVPGroupIndex`
- `qsrVPGroupStatus`
- `qsrEventTimeStamp`
- `qsrEventSeverity`

VP group notifications are sent for the following events:

- Change in name of a VP group
- Enabling and disabling a VP group

Sensor notification

The sensor notification indicates that the state for the specified sensor is not normal. When the sensor returns to the normal state, this event is sent with the `qsrEventSeverity` object set to clear.

`qsrSensorNotification` uses the following objects:

- `qsrSensorValue`
- `qsrSensorState`

- `qsrEventTimeStamp`
- `qsrEventSeverity`

Sensor notifications are sent for the following events:

- Over Temperature
 - Blade number (1 or 2)
 - Sensor number (1 of 3)
- Temperature returned to normal
 - Blade number (1 or 2)
 - Sensor number (1 of 3)
- Fans at high speed
 - PCM number (1 or 2)
- Fans returned to normal speed
 - PCM number (1 or 2)
- PCM installed
 - PCM number (1 or 2)
- PCM removed
 - PCM number (1 or 2)
- PCM powered (AC power connected)
 - PCM number (1 or 2)
- PCM un-powered (AC power removed)
 - PCM number (1 or 2)
- Fan failed
 - PCM number (1 or 2)
 - Fan number (1 of 3)
- Fan returned to operational state
 - PCM number (1 or 2)
 - Fan number (1 of 3)

Generic notification

The generic notification reports events other than the defined event types. It provides a description object that identifies the event in clear text.

`qsrGenericEvent` uses the following objects:

- `qsrEventTimeStamp`
- `qsrEventSeverity`
- `qsrEventDescription`

Generic notifications are sent for the following events:

- FC port configuration change
 - Blade number (1 or 2)
 - Port number (1 of 4)
- iSCSI port configuration change
 - Blade number (1 or 2)
 - Port number (1 of 4)
- iSNS configuration change
 - Blade number (1 or 2)
- NTP configuration change
 - Blade number (1 or 2)
- Router configuration change
 - Blade number (1 or 2)
- Management port configuration change
 - Blade number (1 or 2)
- Firmware upgrade complete
 - Blade number (1 or 2)
- Reboot blade
 - Blade number (1 or 2)

D Log messages

This appendix provides details about messages logged to a file. The message logs are persistent because they are maintained across router power cycles and reboots. Information in the following tables is organized as follows:

- The **ID** column specifies the message identification numbers in ascending order.
- The **Log Message** column indicates the message text displayed in the MPX200 CLI. Note that:
 - Log messages for the iSCSI driver module are common to both iSCSI ports. Log messages beginning with #0 denote iSCSI port 1 (GE1) and log messages beginning with #1 denote iSCSI port 2 (GE2).
 - Log messages for the FC driver module are common to both FC ports. Log messages beginning with #0 denote FC port 1 (FC1) and log messages beginning with #1 denote FC port 2 (FC2).
- The **Module Type** column specifies the message reporting module, where:
 - **App** = Application module (iSCSI, FCIP, or DMS)
 - **FC** = FC driver
 - **FCIP** = FCIP driver
 - **iSCSI** = iSCSI driver
 - **NIC** = NIC module
 - **System** = System module
 - **User** = User module (iSCSI, FCIP, DMS, or WD)
- The **Msg. Type** column specifies the log message type, where:
 - **Error** = Error log message
 - **Fatal** = Fatal log message
 - **Info** = Informational log message
- The **Description** column provides additional information about the log message.

Table 34 MPX200 log messages

ID	Log message	Module type	Msg type	Description
40967	QLBA_NullDoorbell: driver unloaded, port disabled	App	Error	NULL doorbell routine for unloaded drivers. When a driver is unloaded, the doorbell routine is redirected to this NULL routine.
40996	QLBA_ProcessTrb: Processing unsupported ordered tag command	App	Error	Processing unsupported ordered tag task management command.
41004	QLBA_ProcessTrb: Processing unsupported head-of-queue tag command	App	Error	Processing unsupported head-of-queue task management command.
41058	QLBA_CreateTargetDeviceObject: Too many devices	App	Error	Unable to create an object for the target device; exceeded the maximum number of target devices.

Table 34 MPX200 log messages (continued)

41060	QLBA_CreateTargetNodeObject: Too many devices	App	Error	Unable to create an object for the target node; exceeded the maximum number of target devices.
41067	QLBA_CreateLunObject: LunObject memory unavailable	App	Error	Memory unavailable for LUN object.
41077	QLBA_CreateInitiatorObject: Too many initiators	App	Error	Unable to create an object for initiator object; exceeded the maximum number of initiators.
41096	QLBA_DisplayTargetOperationStatus: PCI Error, Status 0x%.2x	App	Error	Process control block status indicates that a PCI error occurred during a target operation.
41106	QLBA_DisplayInitiatorOperationStatus: DMA Error, Status 0x%.2x	App	Error	Process control block status indicates that a DMA error occurred during an initiator operation.
41107	QLBA_DisplayInitiatorOperationStatus: Transport Error, Status 0x%.2x	App	Error	Process control block status indicates that a transport error (protocol) occurred during an initiator operation.
41111	QLBA_DisplayInitiatorOperationStatus: Data Overrun, Status 0x%.2x	App	Error	Process control block status indicates that a data overrun error occurred during an initiator operation.
41234	QLIS_LoginPduContinue: Operation failed. Initiator 0x%x, TPB status 0x%x	App	Error	iSCSI login failed between receipt of PDU and request for the data segment.
41238	QLKV_ValidateLoginTransitCsgNsgVersion failed (status 0x%x)	App	Error	iSCSI login failed due to unsupported version number in received login PDU.
41257	QLIS_LoginPduContinue: Invalid initiator name. Initiator:	App	Error	iSCSI login PDU contains invalid initiator name. The format and character set used to form the initiator name is invalid.
41265	QLIS_LoginPduContinue: Target not configured for Portal	App	Error	iSCSI target login was attempted to a portal (iSCSI1 or iSCSI2) on which the target is not presented.
41267	QLIS_LoginPduContinue: Target not found. Target name:	App	Error	iSCSI login PDU received for a target with a target name unknown to the router.
41268	QLIS_LoginPduContinue: Missing target name	App	Error	iSCSI login PDU received without a target name for a normal session.
41270	QLIS_LoginPduContinue: TSIH is 0 but InitiatorName key/value not provided	App	Error	iSCSI login PDU received without an initiator name key/value.
41272	QLIS_LoginPduContinue: CONN_STATE_IN_LOGIN, Unknown InitTaskTag	App	Error	iSCSI login PDU received with an incorrect initiator task tag for a session which is partially logged in. This would occur if a login PDU other than the initial login PDU used an initiator task tag which was different than the initiator task tag provided in the initial login PDU.
41283	QLIS_LoginPduContinue: TSIH 0x%x out of range	App	Error	iSCSI login PDU was received with a TSIH out of range. This would occur if the iSCSI initiator attempting the login failed to use the TSIH value provided in the Target Login Response PDU

Table 34 MPX200 log messages (continued)

				(router is target) in subsequent login PDUs.
41284	QLIS_LoginPduContinue: Session does not exist, invalid TSIH 0x%x	App	Error	iSCSI login PDU was received with an invalid TSIH value. The TSIH is invalid because there is no session with that TSIH value. This would occur if the iSCSI initiator attempting the login failed to use the TSIH value provided in the target login response PDU (router is target) in subsequent login PDUs.
41353	QLIS_LoginPduContinue: Session does not exist, invalid TSIH 0x%x	App	Error	iSCSI login rejected due to a CHAP authentication error.
41354	QLIS_LoginPduContinue: Unexpected CHAP key detected	App	Error	iSCSI login rejected due to a CHAP key error.
41508	QLBI_SetPortInfo: QLUT_AllocatePortalObject failed (PortType 0x%x, PortId 0x%x)	App	Error	Failed to allocate an object for Set Port Info IOCTL processing: PortType: 0 = FC, 1 = iSCSIPortId: 0 = FC1 or iSCSI1(GE1), 1 = FC2 or iSCSI2 (GE2)
41626	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	App	Error	Inquiry command failed. The Inquiry command was issued by the router as part of its discovery process.
41629	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	App	Error	Pass-Through command for Inquiry command for page 83 failed. The Inquiry command was issued by the router as part of its discovery process.
41635	QLBI_Passthru: Invalid data length %d bytes	App	Error	Pass-Through command for Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
41636	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	App	Error	Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
41696	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	App	Error	Pass-Through command issued by management application (such as GUI) was aborted.
41700	QLBI_Passthru: Invalid CDB length %d bytes	App	Error	Pass-Through command issued by management application (such as GUI) failed due to invalid CDB length.
41701	QLBI_Passthru: Invalid data length %d bytes	App	Error	Pass-Through command issued by management application (such as GUI) failed due to invalid data length.
41717	QLBI_Passthru: Invalid data length %d bytes	App	Error	Pass-Through command issued by management application (such as GUI) was interrupted or timed out.
41750	QLBI_Ioctl: ERROR: Operation (0x%x) not supported in this mode	App	Error	IOCTL operation unsupported. Operation code provided in log message.
41768	QLBI_GetLunList: REPORT LUNS command failed	App	Error	Report LUNs command failed. The Report LUNs command was issued by

Table 34 MPX200 log messages (continued)

				the router as part of its discovery process.
41769	QLBI_GetLunList: REPORT LUNS command failed with CHECK CONDITION, SCSI STATUS 0x%02X	App	Error	Report LUNs command failed with check condition status. The Report LUNs command was issued by the router as part of its discovery process.
41771	QLBI_GetLunList: Lun allocation failed for LunId %d	App	Error	Failed to allocate LUN object; out of resources.
41994	QLFC_Login: VpIndex (%d) out of range	App	Error	Login attempted using FC VP index that is out-of-range (range = 0–31). Index reported in log message.
41995	QLFC_Login: VP Index 0x%x not configured	App	Error	Login attempted using FC VP index that has not been configured. Operation attempted on an unconfigured VP.
42002	QLFC_Login: Can't open connection	App	Error	Attempting login but FC connection cannot be opened.
42024	QLFC_Logout: No active path to device. WWPN: %.2X%.2X%.2X%.2X%.2X%.2X%.2X%.2X	App	Error	Attempting logout of device for which there is no active path (WWPN not found).
42027	QLFC_Logout: VP Index 0x%x not configured	App	Error	Logout attempted using FC VP index that has not been configured. Operation attempted on an unconfigured VP.
42068	QLFC_HandleTeb: System Error	App	Error	Event notification; FC processor encountered a system error (unrecoverable firmware error).
42069	QLFC_HandleTeb: Driver Fatal Error	App	Error	Event notification; FC driver encountered a fatal error.
42072	QLFC_HandleTeb: Driver Fatal Error	App	Error	Event notification; FC port logged out.
42242	QLIS_AllocateSessionObject: Out of session resources	App	Error	Failed to allocate object for iSCSI session; out of session resources.
42252	QLIS_EnqueueiScsiPdu: Duplicate PDU, CmdSN %d (0x%x), dropping it	App	Error	Received iSCSI PDU with duplicate command sequence number (CmdSN). Command PDU will be dropped.
42258	QLIS_InstantiateSession: Can't add Initiator to the database	App	Error	Unable to allocate iSCSI initiator object while instantiating session.
42259	QLIS_InstantiateSession: Maximum number (%d) of allowed hosts already logged in	App	Error	iSCSI session login rejected because the maximum number of allowed hosts are already logged in.
42404	QLIS_InstantiateSession: Maximum number (%d) of allowed hosts already logged in	App	Error	Failed to execute iSCSI Command PDU because its CmdSN is out-of-range. Log message contains the incorrect CmdSN, the valid CmdSN range, the first byte of the CDB, and the data length.
42648	QLIS_HandleTeb: Driver Fatal Error	App	Error	Event notification; iSCSI driver encountered a fatal error.
42649	QLIS_HandleTeb: Unload Driver	App	Error	Event notification; an IOCTL request was received to unload the iSCSI driver.

Table 34 MPX200 log messages (continued)

42654	QLIS_HandleTeb: iSNS Connection Failed	App	Error	Event notification; attempt to connect to the iSNS server failed.
43265	QLUT_AllocateTpbExtension: TPB allocation failed	App	Error	Failed to allocate memory for TPB extension.
43267	QLUT_AllocateTpbExtension: Alloc of DSD failed for buffer len %d	App	Error	Failed to allocate DSD (buffer length %d).
43268	QLUT_AllocateTpbExtension: Data buffer allocation failed (length %d)	App	Error	Failed to allocate data buffer (length %d).
53254	System Booting Up.	App	Info	Router is booting up.
53357	QLBA_ProcessTpb: De-compression failed. Disabling compression temporarily	App	Info	Decompression failed. Disabling compression temporarily.
53584	QLIS_LoginPduContinue: [0x%x] SES_STATE_LOGGED_IN NORMAL	App	Info	iSCSI session full feature login.
53585	QLIS_LoginPduContinue: [0x%x] SES_STATE_LOGGED_IN DISCOVERY	App	Info	iSCSI session discovery login.
53586	QLIS_LoginPduContinue: Initiator: %s	App	Info	iSCSI login of Initiator: %s.
53587	QLIS_LoginPduContinue: Target: %s	App	Info	iSCSI login of Target: %s.
54274	QLFC_Login: Origin 0x%x, VP Index 0x%x, Id 0x%x	App	Info	FC login occurred, origin xx (1 = adapter, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) xx.
54275	QLFC_Login: Port ID %.2x%.2x%.2x	App	Info	FC login occurred with port ID xx.xx.xx.
54276	QLFC_Login: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	FC login occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx.
54277	QLFC_Login: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	FC login occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx.
54306	QLFC_Logout: Origin 0x%x, VP Index 0x%x, Id 0x%x	App	Info	QLFC_Logout: Origin 0x%x, VP Index 0x%x, Id 0x%x.
54307	QLFC_Logout: Port ID %.2x%.2x%.2x	App	Info	FC Logout: Port ID %.2x%.2x%.2x.
54308	QLFC_Logout: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	FC Logout: Node Name xx xx xx xx xx xx xx xx.
54309	QLFC_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	FC Logout: Port Name xx xx xx xx xx xx xx.
54359	QLFC_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	FC login event notification, VPxx.
54683	QLIS_OpenConnectionNotification: Target connection opened (Port %d, DDB %d)	App	Info	iSCSI target connection opened for port %d, DDB %d.
54938	QLIS_OpenConnectionNotification: Target connection opened (Port %d, DDB %d)	App	Info	Event notification; iSCSI open connection request.

Table 34 MPX200 log messages (continued)

54939	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION or UTM_EC_CONNECTION_CLOSED	App	Info	Event notification; iSCSI close connection request or connection closed.
54940	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION or UTM_EC_CONNECTION_CLOSED	App	Info	Event notification; iSCSI connection closed.
54941	QLIS_HandleTeb:iSNS Server Open Connection succeeded	App	Info	Event notification; connection opened with iSNS server.
54943	QLIS_HandleTeb: UTM_EC_ISNS_SCN	App	Info	Event notification; iSNS RSCN received.
54945	QLIS_HandleTeb: UTM_EC_ISNS_CLIENT_DISCOVERED	App	Info	Event notification; iSNS client discovered.
69652	#%d: glutm_init: Diagnostic failed, invalid SRAM	iSCSI	Fatal	iSCSI processor SRAM test failed.
69653	#%d: glutm_init: Diagnostic failed, fail reboot	iSCSI	Fatal	iSCSI processor failed diagnostic reboot.
69654	#%d: glutm_init: Diagnostic failed, invalid NVRAM	iSCSI	Fatal	iSCSI processor failed NVRAM diagnostic.
69655	#%d: glutm_init: Diagnostic failed, invalid DRAM	iSCSI	Fatal	iSCSI processor failed DRAM diagnostic.
69656	#%d: glutm_init: Failed to return diagnostic result to Bridge	iSCSI	Fatal	iSCSI processor failed to return diagnostic results.
69941	#%d: QLUtmProcessResponseQueue: Invalid handle %x EntryType %x	iSCSI	Fatal	Response queue entry contains an invalid handle.
69951	#%d: QLSetNvram: QLRebootTimer failed AF %x RS %x Time %d	iSCSI	Fatal	Set NVRAM reboot timer failed.
69964	#%d: QLDisable: QLRebootTimer failed AF %x RS %x Time %d	iSCSI	Fatal	Port disable reboot timer failed.
69966	#%d: QLEnable: QLRebootTimer failed AF %x RS %x Time %d	iSCSI	Fatal	Port enable reboot timer failed.
70224	#%d: QLProcSrblessiSNSResponse: Invalid handle %x	iSCSI	Fatal	iSNS response contains an invalid handle.
70400	#%d: QLInitializeDevice: QLStartAdapter failed	iSCSI	Fatal	Start iSCSI processor failed.
70417	#%d: QLInitializeAdapter: QLInitializeFW failed	iSCSI	Fatal	iSCSI processor firmware initialization failed.
70432	#%d: QLDoInterruptServiceRoutine: PortFatal interrupt. PortFatalErrorStatus %08x CSR %08x AS %x AF %x	iSCSI	Fatal	iSCSI processor port fatal error.
70448	#%d: QLStartAdapter: QLRebootTimer failed AF %x RS %x Time %d	iSCSI	Fatal	Start iSCSI processor reboot timer failed.
70489	#%d: QLIsrDecodeMailbox: System Error 8002 MB[1-7] %04x %04x %04x %04x %04x %04x %04x	iSCSI	Fatal	iSCSI processor fatal system error.

Table 34 MPX200 log messages (continued)

70499	#%d: QLProcessResponseQueue: Invalid handle for ET_PASSTHROUGH_STATUS	iSCSI	Fatal	Response queue invalid handle for ET pass-through.
70501	#%d: QLProcessResponseQueue: Invalid entry type in response queue %x	iSCSI	Fatal	Response queue invalid entry type.
70502	#%d: QLProcessResponseQueue: Invalid handle %x EntryType %x	iSCSI	Fatal	Response queue invalid handle for specified entry type.
70524	#%d: QLProcessAen: Invalid event %x	iSCSI	Fatal	Asynchronous event for unknown event type.
70544	#%d: QLRebootTimer: Reboot failed!	iSCSI	Fatal	Reboot timer failed.
70563	#%d: QLRebootTimer: Reboot failed!	iSCSI	Fatal	iSCSI driver missed iSCSI processor heartbeat. iSCSI processor rebooted.
70564	#%d: QLRebootTimer: Reboot failed!	iSCSI	Fatal	iSCSI processor failed to complete operation before timeout.
70609	#%d: QLRebootTimer: Reboot failed!	iSCSI	Fatal	iSCSI processor system error restart.
70610	#%d: QLProcessSystemError: RebootHba failed	iSCSI	Fatal	iSCSI processor reboot failed.
70784	#%d: QLConfigChip: invalid NVRAM	iSCSI	Fatal	iSCSI processor NVRAM invalid (checksum error).
70835	#%d: QLStartFw: MBOX_CMD_SET_FLASH failed %x	iSCSI	Fatal	iSCSI controller Set Flash command failed.
70836	#%d: QLStartFw: Invalid Fw loader state 0x%x	iSCSI	Fatal	iSCSI controller failed to load firmware.
70837	#%d: QLStartFw: Load Fw loader timeout	iSCSI	Fatal	iSCSI controller firmware load operation timed out.
70938	#%d: ql_adapter_up: Failed to initialize adapter	iSCSI	Fatal	iSCSI controller failed to initialize.
72351	#%d: QLProcSrblessiSNSResponse: Invalid handle %x	iSCSI	Fatal	iSCSI controller reported that an SNS response had an invalid handle.
73990	#%d: QLUtmIoctlEnable: Initialize FW failed	iSCSI	Error	iSCSI processor failed firmware initialization.
74056	#%d: QLRunDiag: MBOX Diag test internal loopback failed %x %x	iSCSI	Error	iSCSI processor failed the internal loopback test.
74057	#%d: QLRunDiag: MBOX Diag test external loopback failed %x %x	iSCSI	Error	iSCSI processor failed the external loopback test.
74068	#%d: QLUtmReceiveScsiCmd: Invalid ATIO Continuation type %x	iSCSI	Error	iSCSI processor reported an invalid ATIO Continuation type x.
74069	#%d: QLUtmProcessResponseQueue: Immediate data addr %08x:%08x in unsupported PduType	iSCSI	Error	iSCSI processor reported an Immediate data address (xxxxxxxx:xxxxxxxx) in an unsupported PDU type.
74241	#%d: QLIsNSEnableCallback: iSNS Server TCP Connect failed	iSCSI	Error	iSCSI processor could not connect with the iSNS.

Table 34 MPX200 log messages (continued)

74577	#%d: QLIsrDecodeMailbox: NVRAM invalid	iSCSI	Error	iSCSI processor reported that the iSCSI port NVRAM contains invalid data (checksum error).
74580	#%d: QLIsrDecodeMailbox: AEN %04x, Duplicate IP address detected, MB[1-5] %04x %04x %04x %04x %04x	iSCSI	Error	iSCSI processor reported a duplicate IP address was detected (address xxxx xxxx xxxx xxxx xxxx).
74587	#%d: QLIsrDecodeMailbox: Link down	iSCSI	Error	iSCSI processor reported a link down condition.
74656	#%d: QLReadyTimer: Adapter missed heartbeat for %d seconds. Time left %d	iSCSI	Error	Driver failed to receive a heartbeat from the iSCSI processor for the specified number of seconds.
74659	#%d: QLReadyTimer: Adapter missed heartbeat for 0x%x seconds	iSCSI	Error	iSCSI processor (adapter) failed to provide a heartbeat for x seconds.
74660	#%d: QLReadyTimer: Abort pTpb=%p failed, DrvCount 0x%x	iSCSI	Error	iSCSI processor failed to complete an abort request.
74661	#%d: QLTimer: Abort pTpb=%p, Type %x, Timeout 0x%x DrvCount 0x%x, DdbIndex 0x%x	iSCSI	Error	Driver timed out an iSCSI processor operation and is aborting the operation.
74663	#%d: QLReadyTimer: MBOX_CMD %04x %04x %04x %04x %04x %04x %04x timed out	iSCSI	Error	Driver timed out an iSCSI processor mailbox command.
74665	#%d: QLReadyTimer: QLIsNSReenable failed.	iSCSI	Error	Driver timed out while attempting to reconnect with the iSNS.
74705	#%d: QLProcessSystemError: Restart RISC	iSCSI	Error	iSCSI processor was restarted.
74746	#%d: QLInitializeFW: MBOX_CMD_INITIALIZE_FIRMWARE failed %04x %04x %04x %04x %04x %04x	iSCSI	Error	iSCSI processor rejected the firmware initialize command.
74784	#%d: QLUpdateInitiatorData: No more room in Initiator Database.	iSCSI	Error	Driver's initiator database is full. The driver is capable of storing 1024 iSCSI initiators in its database. Use the CLI or GUI to remove unwanted/unused iSCSI initiators.
74800	#%d: QLSetTargetData: No more room in Target Database.	iSCSI	Error	Driver's target database is full. Use the CLI or GUI to remove unwanted/unused iSCSI targets.
75008	#%d: ql_process_error: OB_TCP_IOCB_RSP_W returned DdbInx 0x%x pTpb %p	iSCSI	Error	TCP retry for a frame failed on the connection ddbIndex. Tpb contains the frame memory address.
86347	#%d: QLDisable: Restart RISC	iSCSI	Info	Restart iSCSI processor (RISC).
86349	#%d: QLEnable: Restart RISC to update EEPROM	iSCSI	Info	EEPROM updated, restart iSCSI processor (RISC).
86874	#%d: QLIsrDecodeMailbox: Link up	iSCSI	Info	Link up reported by iSCSI processor for GE1 or GE 2.
87346	#%d: QLGetFwStateCallback: link 100Mb FDX	iSCSI	Info	iSCSI controller reported a link speed/configuration of 100 Mb full-duplex (FDX).

Table 34 MPX200 log messages (continued)

87348	#%d: QLGetFwStateCallback: link 1000Mb FDX	iSCSI	Info	iSCSI controller reported a link speed/configuration of 1000 Mb FDX.
87350	#%d: QLGetFwStateCallback: Invalid link speed 0x%x	iSCSI	Info	iSCSI controller reported an invalid link speed.
102419	#%d: glutm_init: Diagnostic failed, port 1 invalid SRAM	FC	Fatal	FC1 processor SRAM test failed.
102420	#%d: glutm_init: Diagnostic failed, port 1 POST failed	FC	Fatal	FC1 processor POST failed.
102421	#%d: glutm_init: Diagnostic failed, port 2 invalid SRAM	FC	Fatal	FC2 processor SRAM test failed.
102422	#%d: glutm_init: Diagnostic failed, port 2 POST failed	FC	Fatal	FC2 processor POST failed.
102423	#%d: glutm_init: Failed to return diagnostic result to Bridge	FC	Fatal	FC processor failed to return diagnostic results.
102656	#%d: QLInitializeAdapter: Reset ISP failed	FC	Fatal	FC processor failed reset.
102657	#%d: QLInitializeAdapter: Load RISC code failed	FC	Fatal	FC processor firmware load failed.
102658	#%d: QLInitializeAdapter: Load ISP2322 receive sequencer code failed	FC	Fatal	FC processor receive sequencer code load failed.
102659	#%d: QLInitializeAdapter: Load ISP2322 transmit sequencer code failed	FC	Fatal	FC processor transmit sequencer code load failed.
102662	#%d: QLInitializeAdapter: Verify Checksum command failed (%x)	FC	Fatal	FC processor firmware checksum failed.
102680	#%d: QLInitializeFW: FAILED	FC	Fatal	FC processor firmware initialization failed.
102688	#%d: QLInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter	FC	Fatal	FC processor paused due to internal parity error.
102689	#%d: QLInterruptServiceRoutine: Invalid interrupt status: %x	FC	Fatal	FC processor returned an invalid interrupt status.
102716	#%d: QLIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	FC	Fatal	FC processor system error.
102746	#%d: QLProcessResponseQueue: Invalid handle %x, type %x	FC	Fatal	Response queue entry contains an invalid handle.
102752	#%d: QLTimer: Ext Ram parity error exceed limit cnt 0x%x, limit 0x%x, Disabled adapter	FC	Fatal	FC processor external SRAM parity error count exceeded limit; FC port disabled.
102755	#%d: QLTimer: Heartbeat failed	FC	Fatal	FC processor heartbeat failed.
102800	#%d: QLRestartRisc: restart RISC	FC	Fatal	FC processor being restarted.
106583	#%d: QLUtmReceiveIo: Path invalid/FW No resource count %x	FC	Error	FC processor received a SCSI command for an unknown target path

Table 34 MPX200 log messages (continued)

				or has run out of resources to execute additional commands.
106589	#%d: QLIOctlEnable: Adapter disabled	FC	Error	FC processor was disabled by an IOCTL request to the driver.
106590	#%d: QLIOctlEnable: Initialize FW error	FC	Error	FC processor firmware failed initialization. The request to initialize was received by the driver in an IOCTL request.
106592	#%d: QLIOctlRunDiag: Diagnostic loopback command failed %x % %x %x	FC	Error	FC processor failed the external loopback test.
106593	#%d: QLIOctlDisable: Re-initialize adapter failed	FC	Error	FC processor failed to re-initialize in response to an IOCTL disable request.
106803	#%d: QLIsrEventHandler: Link down (%x)	FC	Error	FC processor reported a link down condition.
106813	#%d: QLIsrEventHandler: Unexpected async event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	FC	Error	FC processor reported an unexpected asynchronous event. The mailbox registers provide status, event code, and data related to the event.
106847	#%d: QLProcessResponseQueue: Invalid EntryStatus %x, type %x	FC	Error	FC controller reported an invalid Entry Status %x, type %x.
106851	#%d: QLTimer: Heartbeat failed	FC	Error	FC controller failed to provide a heartbeat.
106853	#%d: QLTimer: Link error count (0x%x) exceeded, link down	FC	Error	Driver has determined that the FC link is unreliable and unusable due to the number of errors encountered. The link has been taken down.
106912	#%d: QLReserveLoopId: out of loop Ids	FC	Error	FC processor was unable to obtain the number of loop IDs required. This failure occurs only when the FC processor is running multi-ID firmware.
106928	#%d: QLMarkDeviceOffline: Device Id: %x marked offline, cLinkDownTimeout = %x, cPortDownRetryCount=%x	FC	Error	Driver was unable to re-establish connection to the target within the timeout and retry counts, and is therefore marking it <i>offline</i> .
106948	#%d: QLSnsGetAllNext: Name server login FAILED %x	FC	Error	FC processor is unable to log into the FC fabric name server.
107029	#%d: QLUpdateDeviceData: out of slots in host database	FC	Error	Driver host (initiator) database is full.
107030	#%d: QLUpdateDeviceData: out of slots in target database	FC	Error	Driver target database is full.
107041	#%d: QLUpdateDeviceDatabase 0x%x: GET_ID failed %x	FC	Error	Driver host (initiator) database is full. Maximum hosts is 64.
107056	#%d: QLUpdateDeviceDatabase 0x%x: out of slots in host database	FC	Error	Driver host (initiator) database is full.
107078	#%d: QLUpdatePort 0x%x: out of slots in host database	FC	Error	Driver was unable to re-establish connection to the target within the timeout and retry counts, and is therefore marking it <i>offline</i> .
107984	#%d: QLWriteFlashDword: Write fails at addr 0x%x data 0x%x	FC	Error	FC controller failed a Flash write (address x data x).

Table 34 MPX200 log messages (continued)

108032	#%d: QLGetVpDatabase: MBOX_CMD_GET_VP_DATABASE for VP %d fatal error	FC	Error	FC controller failed the Get VP Database command (for virtual port %d).
108033	#%d: QLGetVpDatabase: MBOX_CMD_GET_VP_DATABASE for VP %d failed %x	FC	Error	FC controller failed the Get VP Database command (for virtual port %d) with status x.
108049	#%d: QLVerifyMenloFw: EXECUTE_COMMAND_IOC failed MB0 %x MB1 %x	FC	Error	FC controller reported failure status for an Execute IOCB (input/output control block) command.
108050	#%d: QLVerifyMenloFw: EXECUTE_COMMAND_IOC fatal error	FC	Error	FC controller reported a fatal error while processing an Execute IOCB command.
108064	#%d: QLGetFwState: Get Firmware State failed 0-3 %x %x %x %x	FC	Error	FC controller reported failure status for a Get Firmware State command.
118882	#%d: QLioctlDisable: Reset adapter	FC	Info	Request to reset the FC processor (adapter) received from IOCTL interface.
119088	#%d: QLIsrEventHandler: LIP occurred (%x): mailbox1 = %x	FC	Info	FC loop initialization process (LIP) occurred. The LIP type is reported, as is the contents of the FC processor's mailbox 1 register.
119089	#%d: QLIsrEventHandler: LIP reset occurred (%x): mailbox1 = %x	FC	Info	FC LIP reset occurred. The LIP reset type is reported, as is the contents of the FC processor's mailbox 1 register.
119090	#%d: QLIsrEventHandler: Link up (%x) mailbox1 = %x	FC	Info	FC link up occurred. Event status is reported, as is the contents of the FC processor's mailbox 1 register.
119092	#%d: QLIsrEventHandler: Link mode up (%x): RunTimeMode=%x	FC	Info	FC link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).
119093	#%d: QLIsrEventHandler: RSCN update (%x) rscnInfo: %x	FC	Info	An RSCN was received. Event status is reported, as is the RSCN information.
119097	#%d: QLIsrEventHandler: Port update (%x) mb1-3 %x %x %x	FC	Info	FC port update. Event status is reported, as is the contents of the FC processor's mailbox 1, 2, and 3 registers.
119144	#%d: QLTimer: VP %d discover a reject device PID %02x%02x%02x	FC	Info	A virtual port logged into a device, but the device rejected the login.
120278	#%d: QLFlashGetNvram: Invalid Serial Link Control 0x%x for port %d	FC	Info	Update NVRAM for the invalid serial link control for the mezzanine platform.
120373	#%d: QLIsrEventHandler: DCBX Completed (%x)	FC	Info	For FCoE protocol, the data center bridging exchange protocol (DCBX) is complete.
120374	#%d: QLIsrEventHandler: IDC Completion (%x) %x, %x, %x, %x, %x, %x	FC	Info	For FCoE protocol, the inter-driver communication (IDC) is complete.
120375	#%d: QLIsrEventHandler: IDC Notification (%x), %x, %x, %x, %x, %x, %x	FC	Info	For FCoE protocol, the IDC notification came from another driver.

Table 34 MPX200 log messages (continued)

120376	#%d: QLIsrEventHandler: IDC Time Extended (%x), %x, %x, %x, %x, %x, %x, %x, %x	FC	Info	For FCoE protocol, the IDC time extended notification is received.
120377	#%d: QLIsrEventHandler: DCBX Started (%x)	FC	Info	For FCoE protocol, the DCBX protocol has started.
120378	#%d: QLIsrEventHandler: FCF Config Error (%x), MB1=%x	FC	Info	For FCoE protocol, the FCF configuration error occurred.
120379	#%d: QLIsrEventHandler: DCBX Parameter Changed (%x)	FC	Info	For FCoE protocol, the DCBX parameters are changed.
139265	QBRPC_Initialize: Entered	User	Error	RPC (remote procedure call) server initialization entry point.
139266	QBRPC_Initialize: GetBridge Mem Allocation error	User	Error	Get System API memory allocation failed.
139267	QBRPC_Initialize: GetBridgeAdv Mem Allocation error	User	Error	Get System Advanced API memory allocation failed.
139268	QBRPC_Initialize: GetMgmt Mem Allocation error	User	Error	Get Management API memory allocation failed.
139269	QBRPC_Initialize: GetIscsi Mem Allocation error	User	Error	Get iSCSI API memory allocation failed.
139270	QBRPC_Initialize: GetIscsiAdv Mem Allocation error	User	Error	Get iSCSI advanced API memory allocation failed.
139271	QBRPC_Initialize: GetIsns Mem Allocation error	User	Error	Get iSNS API memory allocation failed.
139272	QBRPC_Initialize: GetFcIntfc Mem Allocation error	User	Error	Get FC Interface API memory allocation failed.
139273	QBRPC_Initialize: GetFcAdv Mem Allocation error	User	Error	Get FC Advanced API memory allocation failed.
139280	QBRPC_Initialize: GetFcSfp Mem Allocation error	User	Error	Failed memory allocation for Get FC SFP API.
139281	QBRPC_Initialize: GetLog Mem Allocation error	User	Error	Failed memory allocation for Get Log API.
139282	QBRPC_Initialize: GetStats Mem Allocation error	User	Error	Failed memory allocation for Get Statistics API.
139283	QBRPC_Initialize: InitListMem Allocation error	User	Error	Failed memory allocation for Get Initiator List API.
139284	QBRPC_Initialize: TargetList Mem Allocation error	User	Error	Failed memory allocation for Get Target List API.
139285	QBRPC_Initialize: LunList MemAllocation error	User	Error	Failed memory allocation for Get LUN List API.
139286	QBRPC_Initialize: PresTarget Mem Allocation error	User	Error	Failed memory allocation for Get Presented Targets List API.
139287	QBRPC_Initialize: LunMask Mem Allocation error	User	Error	Failed memory allocation for Get LUN Mask API.
139288	QBRPC_Initialize: Init Mem Allocation error	User	Error	Failed memory allocation for Initiator API.
139289	QBRPC_Initialize: TgtDevice Mem Allocation error	User	Error	Failed memory allocation for Target Device API.

Table 34 MPX200 log messages (continued)

139296	QBRPC_Initialize:FcTgt Mem Allocation error	User	Error	Failed memory allocation for FC Target API.
139297	QBRPC_Initialize:BridgeStatus Mem Allocation error	User	Error	Failed memory allocation for System Status API.
139298	QBRPC_Initialize:Diag Mem Allocation error	User	Error	Failed memory allocation for Diagnostic API.
139299	QBRPC_Initialize:DiagLog Mem Allocation error	User	Error	Failed memory allocation for Diagnostic Log API.
139300	QBRPC_Initialize:FruImage Mem Allocation error	User	Error	Failed memory allocation for FRU Image API.
139301	QBRPC_Initialize:OemMfg Mem Allocation error	User	Error	Failed memory allocation for OEM Manufacturing API.
139302	QBRPC_Initialize:Status Mem Allocation error	User	Error	Failed memory allocation for Status API.
139303	QBRPC_Initialize:TcpIpStats Mem Allocation error	User	Error	Failed memory allocation for TCP/IP Statistics API.
139304	QBRPC_Initialize:NtpStats Mem Allocation error	User	Error	Failed memory allocation for NTP Status API.
139305	QBRPC_Initialize:LunList MemAlloc error	User	Error	Failed memory allocation for LUN List API.
139315	QBRPC_FreeResources:Entered	User	Error	RPC free resources entry point.
139553	checkDuplicateIp: Detected Error %08x %08x%04x	User	Error	Detected duplicate IP address for management port.
139930	FcipRoute##d Failed with Memory Allocation Error	App	Error	FCIP route add/mod failed because of lack of memory.
139931	FcipRoute##d Failed with Invalid Arg Error	App	Error	FCIP route add/mod failed because the arguments supplied were incorrect.
139932	FcipRoute##d Failed with Unknown Device Error	App	Error	FCIP route add/mod failed because of incorrect configuration.
139933	FcipRoute##d Failed with Kernel Error	App	Error	FCIP route add/mod failed because of configuration error.
139934	FcipRoute##d Failed with Network Configuration Error	App	Error	FCIP route add/mod failed because of the Ethernet network configuration.
139935	FcipRoute##d Failed with Persistence Read Failure	App	Error	FCIP route add/mod failed because of an error in reading the saved configuration from persistence.
139936	FcipRoute##d Failed with Persistence Write Failure	App	Error	FCIP route add/mod failed because of an error in writing the route configuration to persistence.
139937	FcipRoute##d Failed with IP Address Reuse Error	App	Error	FCIP route add/mod failed because an IP address supplied is already under use.
139938	FcipRoute##d Add Failed because relevant FCIP Licence not available	App	Error	FCIP route add/mod failed because FCIP license is not present.
151842	FW Upgrade performed: new version is: %d.%d.%d.%d	User	Info	A firmware upgrade was performed, the new version is: d.d.d.d.

Table 34 MPX200 log messages (continued)

151843	REBOOT/SHUTDOWN Command from user. Code=%d	User	Info	User issued a REBOOT or SHUTDOWN command.
151889	#%d: qapisetfcinterfaceparams_1_svc: FC port configuration changed	User	Info	FC port configuration has changed.
151890	#%d: qapisetiscsiinterfaceparams_1_svc: iSCSI port configuration changed	User	Info	iSCSI port configuration has changed.
151891	#%d: qapisetisns_1_svc:iSNS configuration changed	User	Info	iSNS configuration has changed.
151892	qapisetntpparams_1_svc: NTP configuration changed	User	Info	NTP configuration has changed.
151893	#%d: qapisetvlanparams_1_svc: VLAN configuration changed	User	Info	VLAN configuration has changed.
151894	qapisetlunmask_1_svc: Lunmask added for LUN %d	User	Info	LUN mask was added for LUN %d.
151895	qapisetlunmask_1_svc: Lunmask removed for LUN %d	User	Info	LUN mask was removed for LUN %d.
151896	qapisetmgmtnfcparams_1_svc:Management port configuration changed	User	Info	Management port configuration has changed.
151897	qapisetbridgebasicinfo_1_svc:Bridge configuration changed	User	Info	Router configuration has changed.
151908	GE%d: Port status changed by user to ENABLED.	User	Info	GE port %d was enabled user.
151909	GE%d: Port status changed by user to DISABLED.	User	Info	GE port %d was disabled by user.
151910	FC%d: Port status changed by user to ENABLED.	User	Info	FC port %d was enabled by user.
151911	FC%d: Port status changed by user to DISABLED.	User	Info	FC port %d was disabled by user.
151912	qapimaptargetdevice_1_svc: Target WWPN: %2x%2x%2x%2x%2x%2x%2x%2x mapped to iSCSI portal %d.	User	Info	Target at WWPN: xx.xx.xx.xx.xx.xx.xx has been mapped to iSCSI portal %d.
151913	qapimaptargetdevice_1_svc: Target WWPN: %2x%2x%2x%2x%2x%2x%2x unmapped from iSCSI portal %d.	User	Info	Target at WWPN: xx.xx.xx.xx.xx.xx.xx has been unmapped from iSCSI portal %d.
152069	FcipRoute#%d Added	App	Info	FCIP route #n has been successfully added.
152070	FcipRoute#%d Modified	App	Info	FCIP route #n has been successfully modified.
152071	FcipRoute#%d Removed	App	Info	FCIP route #n has been successfully removed.
152082	qapiaddmodifyinitiator_1_svc : Initiator Configuration Changed	User	Info	Initiators configuration has changed.
152083	qapiremoveinitiator_1_svc : Initiator Removed	User	Info	Initiator has been removed.

Table 34 MPX200 log messages (continued)

152129	sysTempMon: Left PCM Installed	User	Info	Left power and cooling module (PCM) is or has been installed.
152130	sysTempMon: Left PCM Un-installed	User	Info	Left PCM is or has been uninstalled.
152131	sysTempMon: Right PCM Installed	User	Info	Right PCM is or has been installed.
152132	sysTempMon: Right PCM Un-installed	User	Info	Right PCM is or has been uninstalled.
152133	sysTempMon: Power for Left PCM Plugged-in	User	Info	Left PCM is connected AC power.
152134	sysTempMon: Power for Left PCM Un-plugged	User	Info	Left PCM is not connected to AC power (unplugged).
152135	sysTempMon: Power for Right PCM Plugged-in	User	Info	Right PCM is connected AC power.
152136	sysTempMon: Power for Right PCM Un-plugged	User	Info	Right PCM is not connected to AC power (unplugged).
152137	sysTempMon: Slot 1 (R1) PCM Fan%d faulty	User	Info	Left PCM (#1) is reporting a faulty fan.
152138	sysTempMon: Slot 2 (R2) PCM Fan%d faulty	User	Info	Left PCM (#1) is reporting a healthy fan.
152139	sysTempMon: Slot 1 (R1) PCM Fan%d healthy	User	Info	Right PCM (#2) is reporting a faulty fan.
152140	sysTempMon: Slot 2 (R2) PCM Fan%d healthy	User	Info	Right PCM (#2) is reporting a healthy fan.
152141	sysTempMon: Over Temperature Front: %dC Rear: %dC CPU1: %dC CPU2: %dC	User	Info	Router has detected an over temperature, Front: %dC Rear: %dC CPU1: %dC CPU2: %dC.
152142	sysTempMon: Setting the fan speed to high	User	Info	Fan(s) speed has been set to high.
152143	sysTempMon: Setting the fan speed to normal	User	Info	Fan(s) speed has been set to normal.
152144	sysTempMon: Temperature back to safe value. Front: %dC Rear: %dC CPU1: %dC CPU2: %dC	User	Info	Router temperature has returned to normal operating range, Front: %dC Rear: %dC CPU1: %dC CPU2: %dC.
152145	sysTempMon: Critical Temperature, Shutting Down Front: %dC Rear: %dC CPU1: %dC CPU2: %dC	User	Info	Router has reached a critical temperature ad is shutting down, Front: %dC Rear: %dC CPU1: %dC CPU2: %dC.
172040	FcipRoute#%d: Cleaning FCIP Instance	FCIP	Error	This is an informative message, not an error. It indicates that an FCIP was removed or modified.
172231	FcipRoute#%d: Did not get the keepalive msg from remote peer	FCIP	Error	FCIP route #n has not been able to communicate with the remote peer for 10 seconds.
172238	FcipRoute#%d: Synchronization Error on Receive	FCIP	Error	FCIP route #n local node is out of sync with the remote peer.
172239	FcipRoute#%d: Decompression Error on Receive	FCIP	Error	FCIP route #n detected an error in de-compression.

Table 34 MPX200 log messages (continued)

172240	FcipRoute#%d: De-encapsulation Error on Receive	FCIP	Error	FCIP route #n local node is out of sync with the remote peer.
172245	FcipRoute#%d: Transmit Failure	FCIP	Error	FCIP route #n not able to transmit data.
172246	FcipRoute#%d: Remote Peer Disconnected	FCIP	Error	FCIP route #n remote peer closed connection.
172247	FcipRoute#%d: Failed to send FC Up/Down	FCIP	Error	Not able to bring the Fibre Channel port up or down.
172249	FcipRoute#%d: FCIP Link Down	FCIP	Error	FCIP link is down for FCIP route #n.
172250	FcipRoute#%d: TCP Link Down	FCIP	Error	TCP link for FCIP route #n has been established.
172253	FcipRoute#%d: Remote Peer IP Address Validation Failed. Expected IP Address: %d.%d.%d.%d, Actual IP Address: %d.%d.%d.%d	FCIP	Error	FCIP route #n: Received connection from unauthorized remote peer.
172272	FcipRoute#%d: Tcp Client's connect attempt failed	FCIP	Error	FCIP route #n is not able to establish the TCP connection with remote peer.
172273	FcipRoute#%d: Tcp Server's Listen attempt failed	FCIP	Error	FCIP route #n TCP server is not able to accept an incoming TCP connection. The TCP server will start listening for new TCP connections.
172300	FcipRoute#%d: tcpi_total_retrans %d, tcpi_reordering %d, tcpi_probes %d	FCIP	Error	Displays FCIP route #n's WAN characteristics, including TCP total retransmission for entire connection (tcpi_total_retrans), packet reordering metric (tcpi_reordering), and unanswered zero window probe (tcpi_probes).
172301	cipRoute#%d: Did not get the keepalive msg from remote peer last %lu, curr %lu	FCIP	Error	The FCIP route #n has not been able to communicate with its remote peer for 10 seconds resulting in a link drop due to a keepalive time-out.
172302	FcipRoute#%d: TCP Link Down, TCP Stats: SACKed=%d TCP Total ReTransmitted=%d	FCIP	Error	The TCP link for FCIP route #n has disconnected. The TCP statistics for the connection include total SACKs (selective acknowledgements) and total retransmission for the connection.
172303	FcipRoute#%d: TCP Link Down, MAC Stats: Tx Dropped Count=%ld Rx Dropped Count=%ld Tx Pause Count=%ld Rx Pause Count=%ld	FCIP	Error	The TCP link for FCIP route #n has disconnected. The MAC or Ethernet statistics include total packet dropped during transmit (TxDropped), total packet dropped during receive (RxDropped), total Ethernet pause frames transmitted (TxPause), and total Ethernet pause frames received (RxPause).
172304	FcipRoute#%d: Tcp Retransmissions in last 10 Sec %d, OutStanding Completions %d FC Frames	FCIP	Error	The total number of TCP retransmissions that happened in the last 10 seconds before the link was brought down due to a keepalive time-out. It also displays the total number of outstanding transmissions that were pending to be transmitted through the GbE port.

Table 34 MPX200 log messages (continued)

172322	FcipRoute#%d: FC link on the remote peer went down	FCIP	Error	The FCIP route #n went down because the Fibre Channel port on the remote peer went down.
184515	FcipRoute#%d: TCP Link Up	FCIP	Info	TCP link for FCIP route #n has been established.
184536	FcipRoute#%d: FCIP Link Up	FCIP	Info	FCIP link is up for FCIP route #n.
184542	FcipRoute#%d: VLAN Info Unavailable	FCIP	Error	FCIP route #n: Incorrect VLAN configuration.
205571	QL3xxx:%s: Auto Negotiation error detected	NIC	Error	Ethernet port was not able to negotiate the configured speed.
205572	QL3xxx:eth%d: Unsupported speed portConfig 0x%x	NIC	Error	Ethernet port speed is not supported.
206080	QL3xxx:ql3xxx_probe: cannot allocate ethernet device %s	NIC	Error	Ethernet device could not be configured.
206089	QL3xxx:ql3xxx_probe: cannot register network device %s	NIC	Error	The Ethernet port was not able to register as a network device, resulting in a port initialization error for the specified network device.
206114	QL3xxx:eth%d: TCP/IP checksum error - TotalChecksumErrorCount = %lu	NIC	Error	The total number of TCP checksum errors detected on the Ethernet link belonging to the eth#%d port.
217856	QL3xxx:%s: PHY Downshift occurred	NIC	Info	Ethernet port is operating at 100Mbps speed.
217857	QL3xxx:%s: Link Up	NIC	Info	Ethernet link is up.
217858	QL3xxx:%s: Link Down	NIC	Info	Ethernet link is down.
218389	QL3xxx:%s Adapter Down	NIC	Info	Ethernet port is down.
218401	QL3xxx:%s Adapter Up	NIC	Info	Ethernet port is up.
233473	"memory monitor: Detected Uncorrectable Ecc %08lx system is rebooting in 5 secs\n"	System	Fatal	Uncorrectable memory error detected at address provided in log message.
233474	"Failed to register interrupt handler!\n"	System	Fatal	Attempt to register the interrupt handler failed.
233475	"%s class_simple_create failed\n"	System	Fatal	Failed class_simple_create system call from memory monitor initialization routine.
237572	"Failed to kill sys killer %d\n"	System	Error	Failed to kill system task.
237573	Temperature over high threshold %d	System	Error	Router temperature has exceeded the high temperature threshold.
249862	Temperature is back to normal range %d	System	Info	Router temperature has returned to the normal operating range.

Table 35 DM log messages

ID	Log Message	Module type	Msg type	Description
44549	QLDM_HandleMigError: Migration Job %d stopped for Src Lun %hd Dest Lun %hd Error %x	App	Error	An error occurred on an I/O that was issued for a migration job. The description provides the job

Table 35 DM log messages (continued)

	AdditionalErrorStatus %x at line %d			id, source and destination lun ids, as well as the error.
56321	QLMP_Logout: Virtual Target Logged out	App	Info	An array went offline because all the target ports of the array went offline.
56322	QLMP_Logout: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	WWNN of the Array that went offline. This is tied with 56321.
56323	QLMP_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	WWPN of the Array that went offline. This is tied with 56321.
56346	QLMP_CombineMPDevice: Virtual Target Online	App	Info	An array came online.
56347	QLMP_CombineMPDevice: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	WWNN of the Array that came online. This is tied with 56346.
56348	QLMP_CombineMPDevice: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x	App	Info	WWPN of the Array that came online. This is tied with 56346.
56842	QLDM_ResumeMigration: Failed to resume job: %d, job's current state: 0x%x, error: %d	App	Info	Failed to resume a paused job.
56865	QLDM_DelayedStart:%d Failed to start job : Job ID: %d	App	Info	Failed to start a delayed schedule job.
56866	Lun is already used for of some other migration job	App	Info	Migration add failed because LUN is part of another migration job.
56867	Selected Lun is a Controller Lun	App	Info	Migration being added with a LUN that is a controller LUN. Data LUNs are required for configuring migration jobs.
56868	Selected Lun is Masked, It cant be used for Offline Migration	App	Info	Migration job being added for a LUN that is masked to an Initiator on the router. Mapped LUNs cannot be used for offline migration jobs.
56869	Read Capacity is not available for the Lun	App	Info	Migration job being added for a LUN for which no Read Capacity Information is available. Migration add will fail.
56870	QLDM_CreateMigrationObject: Failed to create Source Lun Object	App	Info	Failed to allocate memory for the source LUN of a Migration job.
56871	QLDM_CreateMigrationObject: Failed to create Destination Lun Object	App	Info	Failed to allocate memory for the destination LUN of a Migration job.
56872	QLDM_CreateMigrationObject: MigrationObject memory unavailable	App	Info	Failed to allocate memory for the Migration job.
56880	Start time got from user %lu Cur Time: %lu Diff: %d	App	Info	The log displays the configured start time and current time for a delayed migration job.
56881	Failed to stop migration job id %u	App	Info	Failed to stop a migration job.

Table 35 DM log messages (continued)

56884	QLDM_DeleteMigrationJobByLun: Could not find migration object	App	Info	Did not find a Migration job for the associated LUN object.
152096	qapisetmigrfctargets_1_svc: Configuration Changed for migration target	User	Info	A set array was performed on one of the arrays.
152099	LogMigration: Error in Writting log file	User	Info	Encountered an error while updating the migration log entry. Some migration log entries might be missing.
152100	qapiaddgroup_1_svc: Added Group with id %d	User	Info	Group with ID specified in the log got added.
152101	qapiremovegroup_1_svc: Removed Group with id %d	User	Info	Group with ID specified in the log got removed.
152102	qapiupdategroup_1_svc: Updated Group with id %d	User	Info	Group with ID specified in the log got updated.
152103	qapisetserialjobs_1_svc: Serial Time %lu	User	Info	Serial schedule jobs are scheduled to start at time specified in the log.
152104	qapireadjustpriority_1_svc: Readjust Priority Failed on line %d with error %d	User	Info	Readjust Priority command completed with an error. Error code 2 indicates no scheduled jobs were found. Error code 16 indicates that a job with priority 1 is configured.
152105	qapireadjustpriority_1_svc: Readjust Priority Done	User	Info	Completed readjusting the serial schedule priority of Migration jobs.
152106	qapiupdatemigration_1_svc: Update Migration returned with error %d	User	Info	An update migration action [Start/Stop/Pause/Resume] has failed.
152107	RemoveMigration:%d with Job Id %d and error = %d	User	Info	Failed to remove a Migration Job with ID specified in the log.
152108	ValidateSerialSchedule: Previous time %ld New time %ld	User	Info	Reset the serial schedule delayed time to invalid if the last serial schedule job was removed.
152109	addMigration: Creating migration Job Failed with error %d	User	Info	Failed to Create a Migration Job.

Table 36 WD log messages

ID	Log Message	Module type	Msg type	Description
152323	WD: port GE1 mode changed from iSCSI to GE	User	Info	Ports mode changed from iSCSI to Ethernet.
	WD: port GE1 mode restored from GE to iSCSI	User	Info	Ports mode changed from Ethernet to iSCSI.
	WD: port GE1 mode restored from GE to FCIP	User	Info	Ports mode changed from FCIP to Ethernet.
	WD: port GE1 mode changed from FCIP to GE	User	Info	Ports mode changed from Ethernet to FCIP.
	WD: wanlinktest setup completed on GE1 ip 1.1.1.2 socket 3260	User	Info	Wanlink Test Server is started on IP 1.1.1.2 & it is listening on port 3260.
	WD: wanlinktest is stopped successfully.	User	Info	Wanlink test is stopped. Same message is used for client & server.
	WD: wanlink Iteration Count:XX	User	Info	Wanlink Test is executed repeatedly; the iteration count lists the repeated number.
	WD: wanlink GetRTTAndJitter done	User	Info	RTT & Jitter calculation is completed.
	WD: wanlink PMTU Found:1600	User	Info	Path MTU is discovered.
	WD: wanlink UDP B/W Calc Started	User	Info	UDP Bandwidth calculation is started.
	WD: wanlink UDP B/W Found:xxx	User	Info	UDP Bandwidth is calculated.
	WD: wanlink Packetdrop Calc Started	User	Info	Packet Drop calculation started.
	WD: wanlink Packetdrop Calc Done	User	Info	Packet Drop calculation is completed.
	WD: wanlink TCP B/W Calc Started	User	Info	TCP Bandwidth calculation is started.
	WD: wanlink TCP B/W Found:xxx	User	Info	TCP Bandwidth calculation is completed, with result.
	WD: wanlinktest src 1.1.1.2 dest 1.1.1.1:3260 success	User	Info	Wanlink Test Client started.
140034	WD: wanlinktest setup on {GE2 ip 2.2.2.2 socket 6000} failed	User	Error	Unable to start Wanlink Test server.
	WD: mtu set on interface failed	User	Error	MTU setting failed.
	WD: Unable to restore GE2 to iSCSI mode, error xx	User	Error	Unable to restore mode of port after Wanlink Test.
	WD: Unable to configure port speed for interface GE2	User	Error	Error while setting port speed.
	WD: Path MTU detection failed - defaulting to 1500 MTU	User	Error	Path MTU detection failed; default PMTU is now assumed to be 1500
	WD: Wrong IscsiPort LinkRate for interface GE2	User	Error	Invalid link rate.
	WD: Unable to reset IPv4 configuration of GE2	User	Error	Unable to change IPv4 setting.
	WD: Unable to reset IPv6 configuration of GE2	User	Error	Unable to change IPv6 setting.
	WD: Unable to restore GE2 to FCIP mode, error xx	User	Error	Unable to restore mode of port after Wanlink Test.

Table 36 WD log messages (continued)

WD: Unable to resotre GE2 Network IPV4 params	User	Error	Unable to change IPV4 setting back to original.
WD: Unable to resotre GE2 Network IPV6 params	User	Error	Unable to change IPV6 setting back to original.
WD: Unable to set FCIP parameters on GE2	User	Error	Error occurred while changing FCIP port property.
WD: Error Unable to do interface GE2 down	User	Error	Error while shutting down interface.
WD: Error Unable to do WanLinkTestConfigureIP:xx	User	Error	Error while configuring IP address for Wanlink Testing.
WD: Unable to get iSCSI parameters GE2 xx	User	Error	Unable to fetch iSCSI parameters.
WD: Unable to set iSCSI parameters on GE2	User	Error	Unable to store iSCSI parameters.
WD: Unable to set properies of PMTU request connection	User	Error	Path MTU client is not able to set required property of the socket.
WD: unable to configure (err 2) PMTU Thread	User	Error	Path MTU Server configuration failure.
WD: Unable to bind PMTU server socket	User	Error	Path MTU server failed to bind to the socket.
WD: PMTU Listen Failed	User	Error	Path MTU server failed to start listing socket.
WD: Unable to perform PMTU calculation, error code xx	User	Error	Path MTU calculation failed; insufficient resources.
WD: Unable to perform PMTU calculation, no memory	User	Error	Path MTU calculation failed, insufficient resources.
WD: client to pmtu server Connect failed:xx	User	Error	Unable to connect to PMTU server running on Wanlink Test Sever.
WD: unable to begin Wan Link Test Calcuation procedure	User	Error	Wanlink Test Calculation has not started.
WD: wanlink Time expired	User	Error	Wanlink Calcuation did not finish within expected time.
WD: Error getting RTT and Jitter	User	Error	Error occurred while fetching the RTT & Jitter calculation result.
WD: Error getting UDP MTU & Bandwidth	User	Error	Error occurred while fetching the UDP Bandwidth & MTU calculation result.
WD: Error getting Packet Drop	User	Error	Error occurred while fetching the Packet Drop calculation result.
WD: Error getting TCP Bandwidth	User	Error	Error occurred while fetching the TCP Bandwidth calculation result.
WD: Destination IP address and Port not reachable.	User	Error	Ping test failed.
WD: Error opening offline stats file	User	Error	Unable to report Wanlink test results.
WD: wanlinktest setup failed, Invalid parameter received.	User	Error	User provided invalid parameter.

Table 36 WD log messages (continued)

	WD: wanlinktest setup GetportInfo Failed.	User	Error	Wanlink Test failed because error occurred while reading port information.
	WD: Unable to start PMTU thread due to insufficient system resources	User	Error	Path MTU calculation process not started due to insufficient resources.
	WD: wanlinktest setup on {GE2 ip 1.1.1.1 socket xxxx} failed.	User	Error	Wanlink Test not started on server side.
	WD: wanlinktest start GetportInfo Failed. xx	User	Error	Wanlink Test failed because error occurred while reading port information.
	WD: Unable to perform The Client Calculation due insufficient system resources	User	Error	Wanlink Test Calculation cannot proceed due to low memory.
	WD: Unable to stop Wan Link Test Calculation, rc = xx	User	Error	Error occurred while stopping Wanlink Test.
	WD: Unable to stop PMTU Server, rc = xx	User	Error	Error occurred while stopping PMTU discovery process.
	WD: error getting RTT Ping returned -1 s:1.1.1 d:1.1.2	User	Error	Ping test failed.
	WD: 1.1.1.2 Not reachable:42485	User	Error	Ping test failed.
	WD: wanlinktest src 1.1.1.1 dest 1.1.2:3260 failed	User	Error	Wanlink Testing failed.

E HP mpx100/mpx100b to MPX200 upgrade

The purpose of this appendix is to provide the steps required to replace an existing installation of the EVA iSCSI Connectivity Kit (mpx100/mpx100b) with the MPX200 Multifunction Router. This appendix assumes that the user is familiar with HP EVA, HP Command View EVA, SSSU, EVA iSCSI Connectivity Kit (mpx100/mpx100b), and the MPX200 Multifunction Router. You must plan for downtime, since this upgrade procedure requires production interruption.

To upgrade from mpx100/mpx100b to the MPX200 Multifunction Router:

1. Using the CLI or mpx Manager, capture the mpx100 configuration backup by performing a Save FRU on each router. This is only for backup.
2. Capture the P6000 EVA configuration via SSSU for backup.
3. Before shutting down all servers, shut down all applications that access the iSCSI storage.
 - a. For Windows, remove all targets from the Favorite Target tab in the iSCSI applet. Remove all IP addresses in the Discovery tab.
 - b. For Linux, delete everything in the Send Targets and Nodes folders to clean up all target information.
4. Shut down all servers attached to the mpx100.
5. Use the HP P6000 Command View GUI or run SSSU to unpresent LUNs.

Example 1 SSSU:

```
delete iscsi_lun iscsi_host="\Hosts\mpx100\BL6\BL6-02"  
vdisk="\Virtual Disks\mpx100\mpx100-D002"
```

6. Use the HP P6000 Command View GUI or run SSSU to delete iSCSI hosts.
7. Remove the iSCSI Controllers in HP P6000 Command View. This succeeds after all LUNs have been unpresented.
8. Physically disconnect and remove the mpx100/mpx100b.
9. Connect MPX200 to SAN Switches or directly to P6000 EVA ports as shown in ["MPX200 configuration options for P6000 EVA" \(page 15\)](#).
10. Install/upgrade to HP P6000 Command View 9.2 or the latest version available.
11. For physical installation instructions, cable Ethernet and Fibre Channel connections, depending on your configuration, see ["Installing the MPX200" \(page 26\)](#).

NOTE: Zoning may be required at this point for fabric attached configurations.

12. To configure the MPX200 (see ["Managing MPX200 iSCSI using HP P6000 Command View" \(page 31\)](#) to configure the MPX200):
 - a. Set the management port.
 - b. Perform iSCSI MPX controller discovery.
 - c. Set iSCSI IP Addresses.

NOTE: Ensure that the latest firmware is installed.

13. Boot all Hosts. Configure each iSCSI initiator to perform a discovery of the MPX200 target portals.
14. Create an iSCSI host entry for each initiator using HP P6000 Command View or SSSU.
15. Represent LUNs with the HP P6000 Command View GUI or SSSU to MPX200 iSCSI Hosts.

Example 2

```
ADD ISCSI_LUN VDISK=MPX200-D002 ISCSI_HOST="\Hosts\MPX200\BL6\BL6-02"
```

16. Boot Hosts.

- a. Linux:
 - i. Restart iSCSI service.
 - ii. Configure MPIO - multipath -v3 & multipath -ll to verify.
 - iii. Mount drives.
- b. Windows:
 - i. On the **Targets** tab of the iSCSI Initiator applet, click **Refresh**.
 - ii. Log in to proper targets.
 - iii. Rescan devices and use Disk Management to mount disks.

F Regulatory compliance and safety

Regulatory compliance notices

Federal Communications Commission notice for Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, your product has been assigned a unique Regulatory Model Number. The RMN can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this RMN. The Regulatory Model Number should not be confused with the marketing name or model number of the product.

Laser device

All HP systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light.

Laser safety warning



WARNING! To reduce the risk of exposure to hazardous radiation:

- Do not try to open the laser device enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP authorized service technicians to repair the laser device.

Certification and classification information

This product contains a laser internal to the fiber optic (FO) transceiver for connection to the Fibre Channel communications port.

In the US, the FO transceiver is certified as a Class 1 laser product conforming to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. A label on the plastic FO transceiver housing indicates the certification.

Outside the US, the FO transceiver is certified as a Class 1 laser product conforming to the requirements contained in IEC 825-1:1993 and EN 60825-1:1994, including Amendment 11:1996 and Amendment 2:2001.

Laser product label

The optional label in [Figure 131 \(page 241\)](#) or equivalent may be located on the surface of the HP supplied laser device.

Figure 131 Class 1 laser product label



This optional label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label may appear on the laser device installed in your product.

International notices and statements

Canadian notice (avis Canadien)

Class A equipment

This Class A Digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Korean notices

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약
잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기
바랍니다.

B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든지역에서 사용할 수 있습니다.

상호 또는 성명

QLOGIC CORPORATION

Safety notices

Battery replacement notice

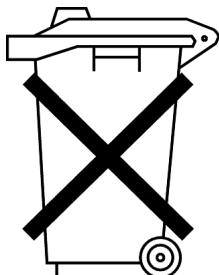
Your switch is equipped with a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by an HP authorized

service provider using the HP spare part designated for this product. For more information about battery replacement or proper disposal, contact an HP authorized service provider.



WARNING! Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. There is risk of fire and burns if the battery pack is not properly handled. To reduce the risk of personal injury:

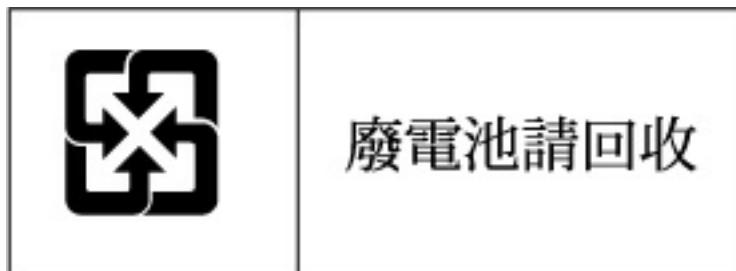
- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 60 °C.
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the HP spare part designated for this product.



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an HP authorized reseller or service provider.

Taiwan battery recycling notice



The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, give-away, or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Power cords

The power cord set must meet the requirements for use in the country where the product was purchased. If the product is to be used in another country, purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm² or 18 AWG, and the length of the cord must be between 1.8 m, (6 ft) and 3.6 m (12 ft). If you have questions about the type of power cord to use, contact an HP authorized service provider.

NOTE: Route power cords so that they will not be walked on and cannot be pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

Japanese power cord statement

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Chinese warning messages

Altitude warning message



仅适用于海拔 2000m 以下地区安全使用

May be used safely only in areas where the attitude is less than 2000m.

Non-tropical warning message



仅适用于非热带气候条件下安全使用

May be used safely only in non-tropical climates.

Waste Electrical and Electronic Equipment directive

English notice

Disposal of waste equipment by users in private households in the European Union

☒ This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, contact your local city office, your household waste disposal service, or the shop where you purchased the product.

Dutch notice

Verwijdering van afgedankte apparatuur door privé-gebruikers in de Europese Unie

☒ Dit symbool op het product of de verpakking geeft aan dat dit product niet mag worden gedeponeerd bij het normale huishoudelijke afval. U bent zelf verantwoordelijk voor het inleveren van uw afgedankte apparatuur bij een inzamelingspunt voor het recyclen van oude elektrische en elektronische apparatuur. Door uw oude apparatuur apart aan te bieden en te recycelen, kunnen

natuurlijke bronnen worden behouden en kan het materiaal worden hergebruikt op een manier waarmee de volksgezondheid en het milieu worden beschermd. Neem contact op met uw gemeente, het afvalinzamelingsbedrijf of de winkel waar u het product hebt gekocht voor meer informatie over inzamelingspunten waar u oude apparatuur kunt aanbieden voor recycling.

Czechoslovakian notice

Likvidace zařízení soukromými domácími uživateli v Evropské unii



■ Tento symbol na produktu nebo balení označuje výrobek, který nesmí být vyhozen spolu s ostatním domácím odpadem. Povinností uživatele je předat takto označený odpad na předem určené sběrné místo pro recyklaci elektrických a elektronických zařízení. Okamžité třídění a recyklace odpadu pomůže uchovat přírodní prostředí a zajistí takový způsob recyklace, který ochrání zdraví a životní prostředí člověka. Další informace o možnostech odevzdání odpadu k recyklaci získáte na příslušném obecním nebo městském úřadě, od firmy zabývající se sběrem a svozem odpadu nebo v obchodě, kde jste produkt zakoupili.

Estonian notice

Seadmete jäätmete kõrvaldamine eramajapidamistes Euroopa Liidus

☒ See tootel või selle pakendil olev sümbol näitab, et kõnealust toodet ei tohi koos teiste majapidamisjäätmeteega kõrvaldada. Teie kohus on oma seadmete jäätmed kõrvaldada, viies need elektri- ja elektroonikaseadmete jäätmete ringlussevõtmiseks selleks ettenähtud kogumispunkti. Seadmete jäätmete eraldi kogumine ja ringlussevõtmine kõrvaldamise ajal aitab kaitsta loodusvarasid ning tagada, et ringlussevõtmine toimub viisil, mis kaitseb inimeste tervist ning keskkonda. Lisateabe saamiseks selle kohta, kuhu oma seadmete jäätmed ringlussevõtmiseks viia, võtke palun ühendust oma kohaliku linnakantselei, majapidamisjäätmete kõrvaldamise teenistuse või kauplusega, kust Te toote ostsite.

Finnish notice

Laitteiden hävittäminen kotitalouksissa Euroopan unionin alueella

☒ Jos tuotteessa tai sen pakkauksessa on tämä merkki, tuotetta ei saa hävittää kotitalousjätteiden mukana. Tällöin hävitettävä laite on toimitettava sähkölaitteiden ja elektronisten laitteiden kierrätyspisteesseen. Hävitettävien laitteiden erillinen käsittely ja kierrätys auttavat säestämään luonnonvaroja ja varmistamaan, että laite kierrätetään tavalla, joka estää terveyshaitat ja suojelee luontoa. Lisätietoja paikoista, joihin hävitettävät laitteet voi toimittaa kierrätäväksi, saa ottamalla yhteyttä jätehuoltoon tai liikkeeseen, josta tuote on ostettu.

French notice

Élimination des appareils mis au rebut par les ménages dans l'Union européenne

☒ Le symbole apposé sur ce produit ou sur son emballage indique que ce produit ne doit pas être jeté avec les déchets ménagers ordinaires. Il est de votre responsabilité de mettre au rebut vos appareils en les déposant dans les centres de collecte publique désignés pour le recyclage des équipements électriques et électroniques. La collecte et le recyclage de vos appareils mis au rebut indépendamment du reste des déchets contribue à la préservation des ressources naturelles et garantit que ces appareils seront recyclés dans le respect de la santé humaine et de l'environnement. Pour obtenir plus d'informations sur les centres de collecte et de recyclage des appareils mis au rebut, veuillez contacter les autorités locales de votre région, les services de collecte des ordures ménagères ou le magasin dans lequel vous avez acheté ce produit.

German notice

Entsorgung von Altgeräten aus privaten Haushalten in der EU

☒ Das Symbol auf dem Produkt oder seiner Verpackung weist darauf hin, dass das Produkt nicht über den normalen Hausmüll entsorgt werden darf. Benutzer sind verpflichtet, die Altgeräte an einer Rücknahmestelle für Elektro- und Elektronik-Altgeräte abzugeben. Die getrennte Sammlung und ordnungsgemäße Entsorgung Ihrer Altgeräte trägt zur Erhaltung der natürlichen Ressourcen bei und garantiert eine Wiederverwertung, die die Gesundheit des Menschen und die Umwelt schützt. Informationen dazu, wo Sie Rücknahmestellen für Ihre Altgeräte finden, erhalten Sie bei Ihrer Stadtverwaltung, den örtlichen Müllentsorgungsbetrieben oder im Geschäft, in dem Sie das Gerät erworben haben.

Greek notice

Απόρριψη άχρηστου εξοπλισμού από χρήστες σε ιδιωτικά νοικοκυριά στην Ευρωπαϊκή Ένωση



☒ Το σύμβολο αυτό στο προϊόν ή τη συσκευασία του υποδεικνύει ότι το συγκεκριμένο προϊόν δεν πρέπει να διατίθεται μαζί με τα άλλα οικιακά σας απορρίμματα. Αντίθετα, είναι δική σας ευθύνη να απορρίψετε τον άχρηστο εξοπλισμό σας παραδίδοντάς τον σε καθορισμένο σημείο συλλογής για την ανακύκλωση άχρηστου ηλεκτρικού και ηλεκτρονικού εξοπλισμού. Η ξεχωριστή συλλογή και ανακύκλωση του άχρηστου εξοπλισμού σας κατά την απόρριψη θα συμβάλει στη διατήρηση των φυσικών πόρων και θα διασφαλίσει ότι η ανακύκλωση γίνεται με τρόπο που προστατεύει την ανθρώπινη υγεία και το περιβάλλον. Για περισσότερες πληροφορίες σχετικά με το πώς μπορείτε να παραδώσετε τον άχρηστο εξοπλισμό σας για ανακύκλωση, επικοινωνήστε με το αρμόδιο τοπικό γραφείο, την τοπική υπηρεσία διάθεσης οικιακών απορριμμάτων ή το κατάστημα όπου αγοράσατε το προϊόν.

Hungarian notice

Készülékek magánháztartásban történő selejtezése az Európai Unió területén



☒ A készüléken, illetve a készülék csomagolásán látható azonos szimbólum annak jelzésére szolgál, hogy a készülék a selejtezés során az egyéb háztartási hulladéktól eltérő módon kezelendő. A vásárló a hulladékká vált készüléket köteles a kijelölt gyűjtőhelyre szállítani az elektromos és elektronikai készülékek újrahasznosítása céljából. A hulladékká vált készülékek selejtezéskor begyűjtése és újrahasznosítása hozzájárul a természeti erőforrások megőrzéséhez, valamint biztosítja a selejtezett termékek környezetre és emberi egészségre nézve biztonságos feldolgozását. A begyűjtés pontos helyéről bővebb tájékoztatást a lakhelye szerint illetékes önkormányzattól, az illetékes szeméttelkarító vállalattól, illetve a terméket elárusító helyen kaphat.

Italian notice

Smaltimento delle apparecchiature da parte di privati nel territorio dell'Unione Europea

☒ Questo simbolo presente sul prodotto o sulla sua confezione indica che il prodotto non può essere smaltito insieme ai rifiuti domestici. È responsabilità dell'utente smaltire le apparecchiature consegnandole presso un punto di raccolta designato al riciclo e allo smaltimento di apparecchiature elettriche ed elettroniche. La raccolta differenziata e il corretto riciclo delle apparecchiature da smaltire permette di proteggere la salute degli individui e l'ecosistema. Per ulteriori informazioni relative ai punti di raccolta delle apparecchiature, contattare l'ente locale per lo smaltimento dei rifiuti, oppure il negozio presso il quale è stato acquistato il prodotto.

Latvian notice

Nolietotu iekārtu iznīcināšanas noteikumi lietotājiem Eiropas Savienības privātajās mājsaimniecībās



Šāds simbols uz izstrādājuma vai uz tā iesaiņojuma norāda, ka šo izstrādājumu nedrīkst izmest kopā ar citiem sadzīves atkritumiem. Jūs atbildat par to, lai nolietotās iekārtas tiktu nodotas speciāli iekārtotos punktos, kas paredzēti izmantoto elektrisko un elektronisko iekārtu savākšanai otrreizējai pārstrādei. Atsevišķa nolietoto iekārtu savākšana un otrreizējā pārstrāde palīdzēs saglabāt dabas resursus un garantēs, ka šīs iekārtas tiks otrreizējīgi pārstrādātas tādā veidā, lai pasargātu vidi un cilvēku veselību. Lai uzzinātu, kur nolietotās iekārtas var izmest otrreizējai pārstrādei, jāvēršas savas dzīves vietas pašvaldībā, sadzīves atkritumu savākšanas dienestā vai veikalā, kurā izstrādājums tika nopirkts.

Lithuanian notice

Vartotojų iš privačių namų ūkių įrangos atliekų šalinimas Europos Sąjungoje



Šis simbolis ant gaminio arba jo pakuotės rodo, kad šio gaminio šalinti kartu su kitomis namų ūkio atliekomis negalima. Šalintinas įrangos atliekas privalote pristatyti į specialią surinkimo vietą elektros ir elektroninės įrangos atliekoms perdirbti. Atskirai surenkamos ir perdirbamos šalintinos įrangos atliekos padės saugoti gamtinius išteklius ir užtikrinti, kad jos bus perdirbtos tokiu būdu, kuris nekenkia žmonių sveikatai ir aplinkai. Jeigu norite sužinoti daugiau apie tai, kur galima pristatyti perdirbtinas įrangos atliekas, kreipkitės į savo seniūniją, namų ūkio atliekų šalinimo tarnybą arba parduotuvę, kurioje įsigijote gaminį.

Polish notice

Pozbywanie się zużytego sprzętu przez użytkowników w prywatnych gospodarstwach domowych w Unii Europejskiej



Ten symbol na produkcie lub jego opakowaniu oznacza, że produktu nie wolno wyrzucać do zwykłych pojemników na śmieci. Obowiązkiem użytkownika jest przekazanie zużytego sprzętu do wyznaczonego punktu zbiórki w celu recyklingu odpadów powstały ze sprzętu elektrycznego i elektronicznego. Osobna zbiórka oraz recykling zużytego sprzętu pomogą w ochronie zasobów naturalnych i zapewnią ponowne wprowadzenie go do obiegu w sposób chroniący zdrowie człowieka i środowisko. Aby uzyskać więcej informacji o tym, gdzie można przekazać zużyty sprzęt do recyklingu, należy się skontaktować z urzędem miasta, zakładem gospodarki odpadami lub sklepem, w którym zakupiono produkt.

Portuguese notice

Descarte de Lixo Elétrico N/A Comunidade Européia

Este símbolo encontrado no produto ou N/A embalagem indica que o produto não deve ser descartado no lixo doméstico comum. É responsabilidade do cliente descartar o material usado (lixo elétrico), encaminhando-o para um ponto de coleta para reciclagem. A coleta e a reciclagem seletivas desse tipo de lixo ajudarão a conservar as reservas naturais; sendo assim, a reciclagem será feita de uma forma segura, protegendo o ambiente e a saúde das pessoas. Para obter mais informações sobre locais que reciclam esse tipo de material, entre em contato com o escritório da HP em sua cidade, com o serviço de coleta de lixo ou com a loja em que o produto foi adquirido.

Slovakian notice

Likvidácia vyradených zariadení v domácnostiach v Európskej únii



■ Symbol na výrobku alebo jeho balení označuje, že daný výrobok sa nesmie likvidovať s domovým odpadom. Povinnosťou spotrebiteľa je odovzdať vyradené zariadenie v zbernom mieste, ktoré je určené na recykláciu vyradených elektrických a elektronických zariadení. Separovaný zber a recyklácia vyradených zariadení prispieva k ochrane prírodných zdrojov a zabezpečuje, že recyklácia sa vykonáva spôsobom chrániacim ľudské zdravie a životné prostredie. Informácie o zbernych miestach na recykláciu vyradených zariadení vám poskytne miestne zastupiteľstvo, spoločnosť zabezpečujúca odvoz domového odpadu alebo obchod, v ktorom ste si výrobok zakúpili.

Slovenian notice

Odstranjevanje odslužene opreme uporabnikov v zasebnih gospodinjstvih v Evropski uniji



■ Ta znak na izdelku ali njegovi embalaži pomeni, da izdelka ne smete odvreči med gospodinjske odpadke. Nasprotno, odsluženo opremo morate predati na zbirališče, pooblaščeno za recikliranje odslužene električne in elektronske opreme. Ločeno zbiranje in recikliranje odslužene opreme prispeva k ohranjanju naravnih virov in zagotavlja recikliranje te opreme na zdravju in okolju neškodljiv način. Za podrobnejše informacije o tem, kam lahko odsluženo opremo na recikliranje, se obrnite na pristojni organ, komunalno službo ali trgovino, kjer ste izdelek kupili.

Spanish notice

Eliminación de residuos de equipos eléctricos y electrónicos por parte de usuarios particulares en la Unión Europea

☒ Este símbolo en el producto o en su envase indica que no debe eliminarse junto con los desperdicios generales de la casa. Es responsabilidad del usuario eliminar los residuos de este tipo depositándolos en un "punto limpio" para el reciclado de residuos eléctricos y electrónicos. La recogida y el reciclado selectivos de los residuos de aparatos eléctricos en el momento de su eliminación contribuirá a conservar los recursos naturales y a garantizar el reciclado de estos residuos de forma que se proteja el medio ambiente y la salud. Para obtener más información sobre los puntos de recogida de residuos eléctricos y electrónicos para reciclado, póngase en contacto con su ayuntamiento, con el servicio de eliminación de residuos domésticos o con el establecimiento en el que adquirió el producto.

Swedish notice

Bortskaffande av avfallsprodukter från användare i privathushåll inom Europeiska Unionen

☒ Om den här symbolen visas på produkten eller förpackningen betyder det att produkten inte får slängas på samma ställe som hushållssopor. I stället är det ditt ansvar att bortskaffa avfallet genom att överlämna det till ett uppsamlingsställe avsett för återvinning av avfall från elektriska och elektroniska produkter. Separat insamling och återvinning av avfallet hjälper till att spara på våra naturresurser och gör att avfallet återvinnas på ett sätt som skyddar människors hälsa och miljön. Kontakta ditt lokala kommunkontor, din närmsta återvinningsstation för hushållsavfall eller affären där du köpte produkten för att få mer information om var du kan lämna ditt avfall för återvinning.

G Saving and restoring the MPX200 configuration

The MPX200 configuration information is saved as a .bin or .tgz file, depending on the method used to restore the MPX200 persistent data. The MPX200 configuration information is saved and restored using the MPX200 CLI commands or HP Command View EVA (see “[Saving or restoring the MPX200 configuration](#)” (page 37)).

NOTE: As with any important database, the MPX200 persistent data should be saved periodically to avoid data loss from hardware or software errors. It is also important to save the configuration information before replacing the MPX200.

Saving the configuration using MPX200 CLI

Using the MPX200 CLI to save the configuration information places the file in the MPX200’s FTP directory. You must then move the file using FTP from the MPX200 (an FTP client accesses the file and moves it to any desired location).

To save the configuration using the MPX200 CLI:

1. Log in to the MPX200 using a Telnet session to the management port or the console port:

```
Username: guest  
Password: password
```

2. Enter the following command:

```
MPX200> admin start
```

3. Enter config as the password.

4. Enter the following command:

```
MPX200 (admin) #> fru save  
FRU save completed. Configuration File is HP_Storage-  
Works_MPX200_FRU.bin. Please use FTP to extract the file out from the  
System.  
MPX200 (admin) #>
```

NOTE: The FRU save creates a bin file containing the router persistent data, configuration, and LUN mappings. The file is stored in the router directory /var/ftp. You must then FTP the tar file from the router.

5. Establish an FTP connection to the MPX200 management port and log in:

```
Username: ftp  
Password: ftp
```

6. Enter the following command to set the FTP transfer type to Binary:

```
ftp> bin
```

7. Enter the following command to access the HP_StorageWorks_MPX200_FRU.bin file:

```
ftp> get HP_StorageWorks_MPX200_FRU.bin
```

Restoring the configuration using MPX200 CLI

There are two options for restoring configurations on the MPX200:

- **Full Configuration Restore**, which fully restores the router’s configuration (all configuration parameters and LUN mappings)
- **Partial Restore (Mappings)**, which restores only the LUN mappings

The restored configuration takes effect after the router is rebooted.

To restore the configuration using MPX200 CLI:

1. Establish an FTP connection to the MPX200 management port and log in:

```
Username: ftp  
Password: ftp
```

2. Enter the following command to set the FTP transfer type to binary:
`ftp> bin`
3. Enter the following command to put the `HP_StorageWorks_MPX200_FRU.bin` file:
`ftp> put HP_StorageWorks_MPX200_FRU.bin`
4. Log in to the MPX200 using a Telnet session to the management port or console port:
`Username: guest`
`Password: password`
5. Enter the following command:
`MPX200> admin start`
6. Enter `config` as the password.
7. Enter the following command:
`MPX200 (admin) #> fru restore`
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the Enter key to accept the current
value. If you wish to terminate this process before reaching the end
of the list press 'q' or 'Q' and the Enter key to do so. Type of restore
(0=full, 1=mappings only) [full]
FRU restore completed.
8. Reboot the system for the configuration to take effect.

Glossary

A

array

A storage system that contains multiple disk or tape drives. A disk array, for example, is differentiated from a disk enclosure, in that the array has cache memory and advanced functionality, like RAID and virtualization. Components of a typical disk array include disk array controllers, cache memories, disk enclosures, and power supplies.

B

bandwidth

A measure of the volume of data that can be transmitted at a specified transmission rate. A 1-Gbps/2-Gbps Fibre Channel port can transmit or receive at nominal rates of 1- or 2-Gbps, depending on the device to which it is connected. This corresponds to actual bandwidth values of 106 MB and 212 MB, respectively.

blade

A server computer with a modular design optimized to minimize the use of physical space and energy.

C

CHAP

Challenge Handshake Authentication Protocol. A protocol that defines a methodology for authenticating initiators and targets.

CLI

Command Line Interface.

CNA

Converged network adapter.

D

data migration

The process of transferring data between storage types, formats, or computer systems. Data migration is usually performed programmatically to achieve an automated migration, freeing up human resources from tedious tasks. Migration is a necessary action for retaining the integrity of the data and for allowing users to search, retrieve, and make use of data in the face of constantly changing technology.

DCB

Data center bridging,

DHCP

Dynamic Host Configuration Protocol.

DMS

Data migration service. A technology that simplifies data migration jobs with minimum downtime while providing protection against common user errors.

DSM

Device Specific Module.

E

EVA

Enterprise Virtual Array. The EVA Cluster aggregates multiple EVA subsystems into a single system image and a single point of management. It allows for the pooling and sharing of storage resources to improve efficiency, simplify operations, and improve availability over individual storage subsystems.

F

fabric

A fabric consists of cross-connected Fibre Channel devices and switches.

fan-in

The number of inputs of an electronic logic gate.

fan-out

The number of logic inputs that a given logic output drives.

FC

Fibre Channel. High-speed serial interface technology that supports other higher layer protocols such as SCSI and IP, and is primarily used in SANs. Standardized under ANSI in 1994.

FC-SAN

Fibre Channel SAN.

FCIP

Fibre Channel over Internet Protocol. An Internet Protocol-level storage networking technology. FCIP mechanisms enable the transmission of Fibre Channel information by tunneling data between

SAN facilities over IP networks. This facilitates data sharing over a geographically distributed enterprise.

FCoE Fibre Channel over Ethernet. An encapsulation of Fibre Channel frames over Ethernet networks. This allows Fibre Channel to use 10 Gigabit Ethernet networks while preserving the Fibre Channel protocol. For more information, visit www.fcoe.com.

Fibre Channel See [FC](#).

Fibre Channel over Ethernet See [FCoE](#).

G

GbE Gigabit Ethernet.

H

heartbeat A periodic synchronization signal issued by cluster software or hardware to indicate that a node is an active member of the cluster. The MPX200 heartbeat LED blinks at a rate of once per second during normal operation.

I

initiator A media (host) server that runs the backup/restore application that passes commands and data between the network and the VLS.

IP-SAN Internet Protocol SAN.

IQN iSCSI qualified name.

iSCSI Internet small computer system interface. Transmits native SCSI over the TCP/IP stack. In a system supporting iSCSI, a user or software application issues a command to store or retrieve data on a SCSI storage device. The request is processed by the operating system and is converted to one or more SCSI commands that are then passed to software or to a card. The command and data are encapsulated by representing them as a serial string of bytes proceeded by iSCSI headers. The encapsulated data is then passed to a TCP/IP layer that breaks it into packets suitable for transfer over the network. If required, the encapsulated data can also be encrypted for transfer over an insecure network.

ISL Interswitch link.

iSNS Internet Storage Name Service.

J

jumbo frame In an iSCSI network, a frame that can contain 9000 bytes for large data transfers. A normal frame can contain 1500 bytes.

K

keyword An identifier that has a particular meaning to the command.

L

lossless A class of data compression algorithms that allows the exact original data to be reconstructed from compressed data.

lossy A class of data compression algorithms that allows an approximation of original data to be reconstructed from compressed data.

LUN Logical unit number. Representation of a logical address on a peripheral device or array of devices.

LVM Logical Volume Manager.

M

MPIO	Microsoft Multipathing I/O software.
MTU	Maximum Transmission Unit.
multipath routing	The routing technique of leveraging multiple alternative paths through a network, which can yield a variety of benefits such as fault tolerance, increased bandwidth, or improved security.
MWS	Maximum window size.

N

NIC	Network interface controller.
NPIV	N_Port ID Virtualization.
NTP	Network Time Protocol.

O

OSI	Open Systems Interconnection. A joint ISO and ITU-T standard for computer networks and communication protocols.
OSI Model	A layered description for communications and computer network protocol design.

P

path	A path to a device is a combination of an adapter port instance and a target port as distinct from internal paths in the fabric network. A fabric network appears to the operating system as an opaque network between the adapter (initiator) and the target. Because a path is a combination of an adapter and a target port, it is distinct from another path if it is accessed through a different adapter or it is accessing a different target port. Consequently, when switching from one path to another, the driver might be selecting a different adapter (initiator), a different target port, or both. This is important to the driver when selecting the proper method of failover notification. It can make a difference to the target device, which might have to take different actions when receiving retries of the request from another initiator or on a different port.
-------------	--

PCM

peer-to-peer	A distributed application architecture that partitions tasks or workloads among peers.
POST	Power-On Self Test.

Q

QoS	Quality of service.
------------	---------------------

R

Replication Solutions Manager	See RSM
router	A device that forwards data packets between computer networks.
RSM	Replication Solutions Manager.
RTT	Round trip time.

S

SAN	Storage Area Network. A network of storage devices and the initiators that store and retrieve information on those devices, including the communication infrastructure.
secure shell	See SSH .
SFP	Small form-factor pluggable transceiver.
SMS	SANsurfer Management Suite. QLogic HBA management software.

SNP	Microsoft Scalable Networking Pack.
Spanning tree	A network design that includes redundant links to provide automatic backup paths if an active link fails.
SPOCK	Single Point of Connectivity Knowledge website. SPOCK is the primary portal used to obtain detailed information about supported HP storage product configurations.
SSH	Secure shell. Protocol that secures connections to the switch for the command line interface.
SSSU	Storage System Scripting Utility. An HP command line interface that allows you to configure and control EVAs. Used to script and run repetitious and complex configuration tasks.
Storage System Scripting Utility	See SSSU .

T

target	The storage-device endpoint of a SCSI session. Initiators request data from targets (usually disk drives, tape drives, or other media devices). Typically, a SCSI peripheral device is the target but an adapter may, in some cases, be a target. A target can contain many LUNs. A target is a device that responds to a request by an initiator (the host system). Peripherals are targets, but for some commands (for example, a SCSI COPY command), the peripheral may act as an initiator.
TCP	Transmission Control Protocol.
Telnet	Software that implements the client part of the protocol. Telnet clients are available for nearly all computer platforms. Because of security issues with Telnet, its use has declined in favor of SSH for remote access.

V

VLAN	Virtual LAN.
VMFS	Virtual Machine File System.
VPG	Virtual port group.

W

world wide node name	See WWNN .
world wide port name	See WWPN .
world wide unique LUN name	See WWULN .
WWNN	World wide node name. Unique 64-bit address assigned to a device.
WWPN	World wide port name. Unique 64-bit address assigned to each port on a device. One WWNN may contain multiple WWPN addresses.
WWULN	World wide unique LUN name. WWULN identifiers for SCSI devices are read from page 80 and page 83 of your SCSI block device as based on the SCSI standard.

Z

zoning	Configuring a set of Fibre Channel device ports to communicate across the fabric. Through switches, traffic within a zone can be physically isolated from traffic outside the zone.
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